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Technology Leadership of Elementary Principals: Standards, Competencies, And Integration

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TECHNOLOGY LEADERSHIP OF ELEMENTARY PRINCIPALS: STANDARDS, COMPETENCIES, AND INTEGRATION

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CHAPTER I

INTRODUCTION

The complexities of educational leadership have been studied from many perspectives. Leadership has a history as long as the recorded word, and research and literature from the past has produced a solid foundation from which spring the leadership philosophies of the present. The current literature on educational technology leadership is brief and laced with uncertainty. Appropriately, the information, literature, and research regarding information technology are disseminating at the speed of whatever modem or server one may utilize.

> Today's education world is information and communication intensive, and Information Technology professionals need to be empowered with the knowledge, skills, and abilities that technology offers. Even with the enormous potential and academic advantages that innovation and improvement of communications afford, without the direct participation and support of an institution's leadership, this power cannot be pushed to its full potential. Information technology leadership requires many of the characteristics common to all leaders, but also requires special abilities and insights into technology's impact (Pahal, 2001, p. 1).

Technology is a rapidly growing part of our global society and an increasingly important element in school curricula. There are varied findings in the reports and studies regarding the effectiveness of technology in public schools. Some of the

variables attributed to inconclusive findings are student population, the software design, the educator's role, and the level of student access to technology (Schacter, 1999).

> Recent political and media campaigns have suggested that the number of computers in the school building is a measure of the value of that school. School districts and other educational institutions have responded to this public pressure by purchasing computers, installing networks, developing computer curricula, and providing teacher workshops. In spite of these efforts, schools and institutions are essentially unprepared to integrate computer technology into their everyday teaching and instructional responsibilities (Riedl, et al. 1998, p. 1).

The New Jersey Department of Education (Vision and Benchmarks by 2002), intends to guide all schools in New Jersey toward the acceleration of technology infusion into the curriculum. The benchmarks include technology integration, professional development, technology use, and software and hardware requirements.

Perhaps the most salient ingredient in the achievement of technology integration and the attainment of the New Jersey Technology Benchmarks is the school leader. "Educational leaders are expected to provide direction and support in a technology-rich environment without the benefit of understanding the technology and human elements that are necessary to make that technology an effective instructional tool" (Riedl, et al. 1998, p. 1).

The past several years has seen an expansion in the research into the principal's role in creating a technology rich environment. The structure of the school system needs to be changed and improved if we are to meet the needs of all the students (Sergiovanni, 1992). Fullan (1995) suggests that much of the school system needs to be evaluated

including the values of the existing culture. To reform the present system, principals must work well beyond their role as managers, and become instructional leaders of the school. The key role principals play in school is well documented and acknowledged (Buckner, 1997).

Cradler (2001) indicates a need for principals who are able to work with teachers, community, and the district to focus the implementation of technology use on curricular activities. This research suggests the need for competent educational technology leaders who have the ability to focus the utilization of all technology toward the maximum achievement of the students.

The investigation of leadership qualities as they relate to educational technology, encompasses a large number of variables including values, technology competencies, technology standards, technology richness, technology effectiveness, assessment, student achievement, and technology integration to name a few. This study will focus on administrative technology standards, administrative technology competencies, and institutional technology integration. Due to the interconnectedness of other variables, the discussion may be inclusive for clarity.

Purpose of the Study

The identification of technology leadership competencies is the subject of several recent dissertations, and public and private studies (Polles, 1999; Peterson, 2000; Ford, 2000). One of the most recent projects of the International Society for Technology in Education, has been a national survey to identify Technology Standards for School Administrators (International Society for Technology in Education, ISTE, 2001a). Technology integration has been the subject of study by professional organizations such as The Milken Exchange on Educational Technology, The SouthEast and Islands

Regional Technology in Education Consortium, and the CEO Forum on Technology in Education

The purpose of this study is to investigate the leadership technology standards and technology competencies of the elementary principal. Further, the purpose of this study is to examine how and by what means the principal integrates technology into the educational environment.

Research Questions

1. To what extent do elementary principals relate to leadership technology standards in their professional practice?
2. What are the technology skills and competencies are used by elementary principals?
3. How do elementary principals integrate technology into the educational environment?

Significance of the Study

Technology plans are mandatory. Technology usage is integrated in the state standards. Many states are requiring technology standards for pre-service teachers. Funding for technology increases at a tremendous yearly rate.

The technology standards and technology competencies of the principal as a technology leader have a significant influence on the quality and effectiveness of the technology program. Students can only benefit from technology if the school environment is technology-rich. Students can only benefit from a technology-rich environment if the staff and leadership have a shared vision of how and why technology is integrated into the educational environment.

"Survey results showed that from fiscal 1995 through fiscal 1999, the states earmarked nearly $4 billion for K-12 education technology, and, on average, state

appropriations for education technology have increased each year since fiscal 1995 (Milken Echange, 1999 p. 3). In 1996, spending on educational technology in the United States was reported at $2.4 billion. Also in that same year the *Technology Literacy Challenge Fund,* legislation submitted by the Clinton Administration, contained a $2 billion proposal for national and local technology funding. $200 million was approved by Congress for the fiscal year 1997 with the purpose of generating funds for educational technology through the end of the century. The Federal Government increased the technology spending in 1998 to $425 million, and the 1999 budget saw an increase $136 million, totaling $721 million.

The cost and importance of technology in education is rapidly growing, and the role of the principal is essential in the integration and use of technology.

"Hopefully there is no longer any need for the impatient premise that the value of technology is self evident since there is now a more significant body of research findings which supports its usefulness" (Wellburn, 1996, p. 1). Rather than a continuation of the "usefulness' discussion, this study will focus on the standards, skills, and competencies of the principal as the technology leader and how technology is integrated.

Nearly all of the states in the union have implemented student technology standards. Is it imperative for principals and administrators to adhere to the technology standards and possess technology competencies to maintain effective technology leadership?

"Technology competencies vary in importance from essential to moderately important. Only one competency, integration into instruction, is essential. Integration

into curriculum is very important; however, knowledge of software, terminology, and hardware are moderately important" (Scarpa, 1998).

This study advances the literature and research concerning leadership technology standards, administrative technology competencies, and technology integration in the elementary school.

Further implications involve pre-service and in-service training of elementary principals, and policy at the state and district level.

Limitations

All of the subjects in this study, elementary principals, must be pre-approved by the superintendent of schools, and have volunteered to be interviewed. This limits the scope of the sample.

Definition of Terms

Digital Content- The digitized multimedia material that calls upon students to seek and manipulate information in the collaborative, creative and engaging ways that make digital learning possible. It includes video on demand, software, CD-ROMS, web sites, email, on-line learning management systems, computer simulations, streamed discussions, data files, databases, and audio.

District Factor Grouping- District factor grouping is an index of socioeconomic status that is created using data for indicators available in the centennial Census of Population. The composite statistical index created using statistical procedures, a model of socioeconomic status, and input data for various socioeconomic traits. The 1990 DFG version consists of: Percent Number High School Diploma, Percent Some College, Occupation, Population Density, Income, Unemployment Poverty. There are eight FG

classifications utilized today and they are ranked from lowest socioeconomic groupings to high socioeconomic groups: A,B,C,D,E,F,G,H,I, and J.

Technology in Professional Practice- Refers to those computer skills used by principals in both managerial and academic duties.

Technology- The term technology in this report is used primarily as an indicator of computer usage.

Technology Integration- Technology integration refers to the status of student engagement, teacher engagement, availability and accessibility of appropriate resources, and organizational support that impact integration.

Technology Leaders- Technology leaders are those see technology as a means for advancing leaning and teaching. Bailey and Lumley (1997) suggest that technology leaders have to possess several skills. They include: (1) technology skills—leaders must be able to model the technology, (2) people skills—leaders must be able to get along with other people as we learn to use the new technologies, (3) curriculum skills—leaders must understand how to integrate the technology into all disciplines, (4) staff development skills—leaders must understand the importance of training to those people using the technology, (5) learning leadership—leaders must understand the "big Picture" (systems thinking) as they work with others to use technology to transform teaching and learning (Bailey, 2000 pg.8).

Technology Leadership Standards-The standards for leadership used in this study are the current research-based trends in education. The International Society for Technology in Education's Technology Standards for School Administrators "identify a common focus

for the role of leadership in enhancing learning and school operations through the use of technology" (ISTE, 2001a).

> These standards present targets for school administrators. They are indicators of effective leadership for technology in schools. They define neither the minimum nor maximum level of knowledge and skills required of a leader, and are neither a comprehensive laundry list nor a guaranteed recipe for effective technology leadership. Rather, these standards represent a national consensus among educational stakeholders of what best indicates effective school leadership for comprehensive and effective use of technology in schools (ISTE,2001a).

Technology Leadership Competencies- Technology leadership competencies are the technological skills of the school technology leader. The competencies referred to in this study are word processing, database, spreadsheet, E-mail, presentation applications, desktop publishing, world wide web navigation, search engines, statistical applications, desktop video conferencing, and class scheduling applications.

21st Century Skills- 21st Century Skills have been defined by the CEO Forum's StaR Report (2000).

Digital Age Literacy

1. Basic, Scientific, and Technological Literacy
2. Visual and Information Literacy
3. Cultural Literacy and Cultural Awareness

Inventive Thinking

4. Adaptability/Managing Complexity
5. Curiosity, Creativity, and Risk Taking

6. Higher Order Thinking and Sound Reasoning

Effective Communication

7. Teaming, Collaboration, and Interpersonal Skills

8. Personal and Social Responsibility

9. Interactive Communication

High Productivity

10. Prioritizing, Planning, and Managing for Results

11. Effective use of Real-World Tools

12. Relevant, High Quality Products

Values-

> Values are internalized attitudes about what is right and wrong, ethical and unethical, moral and immoral. Examples include fairness, justice, honesty, freedom, equality, humanitarianism, loyalty, patriotism, progress, self-fulfillment, excellence, pragmatism, courtesy, politeness, and cooperation....they influence a leader's preference and aspirations, a leader's perception of situations and problems, and a leader's choice of behavior in a particular situation (Yukl, 1994).

Organization of the Report

The report of this study is organized into five chapters as follows:

Chapter I presents an overview of the study including the background, purpose of the study, research questions, significance of the study, statement of the problem, limitations, definition of terms, and the organization of the report.

Chapter II presents a review of the literature pertaining to the role of the principal and technology. The sub-chapters include technology leadership and the principal,

technology standards, professional development, technology integration, values, technology leadership competencies, technology rich environments, assessment, and student achievement.

Chapter III describes the subjects, materials, and procedures utilized in this study.

Chapter IV describes the analysis of the data collected.

Chapter V offers a summery of the study along with discussions, conclusions, and recommendations for practice, and implications for further research.

CHAPTER II

REVIEW OF RELATED LITERATURE

> For school administrators to provide effective leadership in their schools in the last years of the twentieth century, they must possess knowledge and understanding of the issues and capabilities of technology. They must also be able to use technology appropriately in the fulfillment of their roles of coordinator and communicator of school programs and activities (Southern Regional Education Board, 2000, p. 1).

In its broadest definition, technology education can be considered perhaps the oldest of disciplines (Zargari & MacDonald, 1994), although the literature review in chapter two is confined to the electronic and computer education from the past decade.

The literature related to technology in K-12 public schools is written from diverse perspectives. This chapter will review the various perspectives associated with technology. The principal areas of literature review are technology leadership and the principal, vision, technology standards, professional development, technology competencies, technology integration, values, technology rich school environments, assessment, and student achievement related to technology.

Technology standards, and technology competencies for technology leadership are emerging from various sources including: Technology Standards for School

Administrators (TSSA); The National Council for Accreditation of Teacher Education (NCATE, 1995); Advanced Programs in Educational Leadership for Principals, Superintendents, Curriculum Directors, and Supervisors (EDLEA) (NCATE, 1995); Southern Regional Education Board Education Technology Cooperative (Technology Standards for School Administrators, 2000); The International Technology Education Association (ITEA, 2001); and, The Interstate School Leaders Licensure Consortium (ISLLC, 1996).

Technology Leadership and the Principal

For many years research has shown the profound effect school leaders have in determining the success or failure of programs and innovations. The school leader determines the success of the entire school (Cawelti, 1987). The effective schools studies indicated that strong, content knowledgeable, visionary leaders administered effective schools and effective program implementation (Lezotte and Bancroft, 1985, Venezky and Winfield, 1979). Fullan (1990) suggests that school administrators are essential and central to instructional program improvement and implementation.

To provide leadership in innovation, leaders must be knowledgeable or possess a certain level of expertise in the content area of the proposed change, thereby providing a clear vision and effectual guidance. "Associated with the vision has to be a plan, a way of reaching the goal" (Pejza, 1985, p. 10). Leithwood and Montgomery (1984) concluded that "goals are the long term aspirations held by principals for work in their schools. No other dimension of principal behavior is more consistantly linked to school improvement by current empirical research than goals" (p. 23).

The personal strengths of school principals are important to leadership in traditional literature, however more rigorous models of leadership indicate the essential aspects of interrelationships between distributed participants (Schultz, 2000).

Modern managers recognize the importance of building relationships in organizations, however Wheatley (1994) suggests that inter-relational managerial techniques uncover a host of relationship-based problems. "How do we get people to work well together? How do we honor and benefit from diversity? How do we get teams working together quickly and efficiently? How do we resolve conflicts? These relationships are confusing and hard to manage..."(Wheatley, 1994, p. 144).

Interpersonal leadership is the initial stage in creating a shift away from the school leader..."instead of worrying constantly about setting the direction and then engaging teachers and others in a successful march, the 'leader' can focus more on removing obstacles..." (Sergiovanni, 1992, p. 43).

Principals play many roles as successful leaders- problem solvers, decision makers, vision seekers, and relationship builders. Principals have several concerns, or quests, that are central to success- justice, teaching, purpose, resource, change, ownership, and autonomy (Ackerman, Donaldson, and Bogert 1996).

Principals are ultimately responsible for determining the appropriate type of technology training for the school staff. Dyrli (1996) suggests that successful professional development can be achieved by utilizing a number of key elements including: offering a variety of options, emphasizing skill development, providing hands on experiences, tailoring programs to local realities, using genuine teaching examples, and providing supporting materials.

As the instructional leader of the school, the principal needs the ability, skills, and knowledge to successfully integrate technology into the curriculum. The role of the principal becomes that of the transformational leader. Kouzes and Posner (1990) constructed a questionnaire to measure transformational leadership. The Leadership Practice Inventory defined five areas:

1. Challenging the process- This means searching for opportunities and experimenting.
2. Inspiring a shared vision- Focuses on what leaders actually do to construct future visions and to build followers' support for the vision.
3. Enabling others to act- Leaders make it possible for followers to take action by fostering collaboration (as opposed to competition) and support followers in their personal development.
4. Modeling the way- Leaders set examples by their own behaviors. They also help followers focus on systemic accomplishments of large-scale goals, making those goals seem more realistic and attainable.
5. Encouraging the heart- Leaders recognize followers' contributions and find ways to celebrate their talents and achievements.

Outstanding principals go beyond merely involving teachers in decision making—they encourage teachers to continuously engage in identifying best practices (Senge, 1990; Watkins & Marsick, 1993).

The Southeast and Islands Regional Technology in Education Consortium (SEIR*TEC), describes leadership at the principal level "the single most important factor affecting the integration of technology into schools". SEIR*TEC is one of ten federally funded regional technology in education consortia (RTEC). Specific behaviors exhibited

by school leaders, that contribute to the successful integration and use of technology include the following:

1. Start with a vision
2. Lead by example
3. Support the faculty
4. Focus, focus, focus
5. Share leadership roles
6. Use evaluation to further professional growth (Byrom & Bingham, 2001)

MacNeil and Delafield (1998) suggest that technology initiatives are in part successful due to the way that they are introduced into the curriculum. Most current models of schooling are not receptive to the integration of technology initiatives. Principals must understand technology and the importance that technology has on both management and instruction. However Thomas (1999) suggested that school leaders are inadequately trained in educational technology and "there is no strong link between school leadership and educational technology" (p. 3).

Mergendollar (1994) suggests that the role of the principal is essential in school technology use. Also, for technology to become used across a district, leadership by the central administration, especially the superintendent, is critical. These findings are supported by the organizational change research, which has consistently found that change efforts do not succeed without active administrative leadership, particularly by principals. Research has shown that leaders perform four important tasks: (a) obtaining resources, (b) buffering the project from outside interference, (c) encouraging staff, and (d) adapting standard operating procedures to the project.

The technology leader should possess the leadership skills and competencies to establish a vision, direction, and guiding principles for the integration of technology. Riedl et.al. (1998) suggests that issues related to technology integration i.e., vision, time, access, support, and assessment, are not clearly understood by public school decision makers.

Vision

> Senge (1990) states " shared vision is vital for the learning organization because it provides the focus and energy for learning. While adaptive learning is possible without vision, generative learning occurs only when people are striving to accomplish something that matters deeply to them. In fact, the whole idea of generative learning—'expanding your ability to create' –will seem abstract and meaningless until people become excited about some vision they truly want to accomplish" (p. 206). Commitment to a vision is rare and is usually mistaken for compliance. Commitment is the complete responsibility for the vision and whatever actions are necessary to see it to fruition (Senge, 1990).
>
> "Transformational technology leaders are creators of future visions and laborers in everyday realities. They emphasize their strengths and minimize their weaknesses. They empower others as well as themselves and thereby transform organizations. They live the questions and paradoxes of leadership in a burgeoning age of technology. They build the field, break the mold, and create new educational models" (Bergeron, 2001, p. 1).

Blumberg and Greenfield (1986) identify three specific factors that contribute to principal success: (1) desiring and eager to make their schools over in their image; (2)

proactive and quick to assume the initiative; and (3) resourceful in being able to structure their roles and the demands on their time in a manner that permitted them to pursue what might be termed their personal objectives as principals. Blumberg and Greenfield (1986) refer to the first factor as principal vision. Although each one of the principals interviewed by Blumberg and Greenfield had definite ideas about what their schools should be like, specifics about vision varied from principal to principal. According to Blumberg and Greenfield (1986), whatever the vision was, it went well beyond the status quo. The vision is a personal commitment that distinguishes them from other administrators, and as vital to the success of the students and teachers in their school.

Westley and Mintzberg (1989), suggest that visionary leadership is dynamic and involves a three stage process:

1. an image of the desired future for the organization (vision) is
2. communication (shared) which serves to
3. "empower those followers so that they can enact the vision" (p. 18).

School administrators that have developed a shared vision with their faculty have also created a common ground that serves to facilitate or compel action to the realization of this common vision. Frequently underlying a shared vision are teachers' and administrators' shared values and beliefs, specifically believing that schools are for students' learning (Southwest Educational Development Laboratory, 2001).

Technology Leadership Standards

The research and literature makes it clear, that leadership plays an important role in the implementation of technology, and large-scale systemic reform. The Technology Standards for School Administrators Collaborative, identify standards that have a

common focus for the leadership role in enhancing learning and school operations through the use of technology (ISTE, 2001a).

The International Society for Technology in Education's (ISTE) Technology Standards for School Administrators (TSSA) has drafted a set of standards for school administrators. The standards represent a national consensus among educational stakeholders of what best indicates effective school leadership for comprehensive and effective use of technology in schools. The following is the TSSA profile of a Technology-Leading Principal, draft v3.0.

I. Leadership and Vision

1. Participate in an inclusive district process by which stakeholders formulate a shared vision that clearly defines expectations for technology use.
2. Develop collaboratively a technology-rich school improvement plan, grounded in research, aligned with the district improvement plan, and congruent with the district vision for technology use.
3. Promote highly effective practices in technology integration among faculty and other staff.

II. Learning and Teaching

4. Assist teachers in using technology to access, analyze, and interpret student performance data, and in using results to appropriately design, assess, and modify student instruction.
5. Collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improving student learning.

III. Productivity and Professional Practice

6. Use a modern technology-based management system to access and maintain personnel and student records.
7. Use a variety of media and formats, including telecommunications and the school Web site, to communicate, interact, and collaborate with peers, experts, and other education stakeholders.

IV. Support, Management, and Operations

8. Provide campus-wide staff development for sharing work and resources across commonly used formats and platforms.
9. Allocate campus discretionary funds and other resources to advance implementation of the technology plan. Advocate for adequate, timely, and high-quality technology support services.
10. Advocate for adequate, timely, and high-quality technology support services.

V. Assessment and Evaluation

11. Promote and model the use of technology to access, analyze, and interpret campus data to focus efforts for improving student learning and productivity.
12. Implement evaluation procedures for teachers that assess individual growth toward establishing technology standards and guide professional development planning.
13. Include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff.

VI. Social, Legal, and Ethical Issues

14. Secure and allocate technology resources to enable teachers to better meet the needs of all learners on the campus.

15. Adhere to and enforce among staff and students the district acceptable use policy and other policies and procedures related to security, copyright, and technology use.
16. Participate in the development of facility plans that support and focus on health and environmentally safe practices related to the use of technology (ISTE, 2001b).

The Southern Regional Education Board, Educational Technology Cooperative is a nation-wide cooperative comprised of eight hundred colleges and universities, and more than thirty three hundred school districts in thirty-eight states. The Educational Technology Cooperative addresses a wide array of technology issues through the use of a task group structure.

The Southern Regional Education Board recommends the following standards for administrators to take a leadership role in the creation of technology related programs:

1. understand the elements and characteristics of long-range planning for the use of current and emergency technology
2. demonstrate ability to analyze and react to technology issues, concepts, and proposals
3. possess a "big picture" vision of technology in education and schools – *reform movement, competency-based education, standards, time allocation*
4. use technology to efficiently communicate with stakeholders
5. use technology to collect and analyze data and other information to improve decision making and other management functions
6. understand how current and available technologies can be effectively integrated into all aspects of the teaching and learning process
7. understand the legal and ethical issues related to technology licensing and usage (Southern Regional Education Board, 2000).

> Tomorrow's educational leaders must be able to work with diverse groups and to integrate ideas to solve a continuous flow of problems. They must study their craft as they practice their craft, reflecting and then applying what they have learned to people and institutions and the achievement of tasks. This requires patience and perspective, the exercise of judgment and wisdom, and the development of new technical and analytical skills. It also demands sensitivity to other cultures and highly developed communications skills. Finally, it requires personal values that integrate the ethical dimensions of decision making with those of a more technical variety (National Council for Accreditation of Teacher Education (NCATE), 1995 p. 2).

The National Council for Accreditation of Teacher Education's (NCATE) Specialty Areas Studies Board (SASB) has approved seventeen sets of program standards. The program standards include *Advanced Programs in Educational Leadership for Principals, Superintendents Curriculum Directors, and Supervisors,* and *Program for Initial Preparation of Teachers of Technology Education,* to be used as a critical part of the accreditation process.

The program standards for Advanced Programs in Educational Leadership have been prepared by the National Policy Board for Educational Administration for the Educational Leadership Constituent Council (EDLEA) (NCATE, 1995) and consist of the following:

1. Professional and Ethical Leadership

    1.2 Use motivational theory to create conditions that motivate staff, students and families to achieve the school's vision (e.g. facilitate collegiality and teamwork, arrange significant work, encourage challenging standards, provide autonomy,

support innovation, delegate responsibility, develop leadership in others, provide leadership opportunities).

1.3 Frame, analyze, and resolve problems using appropriate problem solving techniques and decision making skills.

2. Information Management and Evaluation
3. Curriculum, Instruction, Supervision, and the Learning Environment
4. Professional Development and Human Resources

4.1 Work with faculty and other stakeholders to identify needs for professional development, to organize, facilitate, and evaluate professional development programs, to integrate district and school priorities, to build faculty as resource, and to ensure that professional development activities focus on improving student outcomes.

4.2 Apply adult learning strategies to professional development, focusing on authentic problems and tasks, and utilizing mentoring, coaching, conferencing and other techniques to ensure that new knowledge and skills are practiced in the workplace.

5. Student Personnel Services
6. Organizational Management
7. Interpersonal Relationships

7.1 Use appropriate interpersonal skills.

8. Financial Management and Resource Allocation
9. Technology and Information Systems
10. Community and Media Relations

11. Education Law, Public Policy and Political Systems

The program standards for the Program for Initial Preparation of Teachers of Technology Education have been prepared by the International Technology Education Association (ITEA, 2001) and the Council on Technology Teacher Education (CTTE), and consist of the following:

1. Technology Philosophy based on research
2. Possess depth in related disciplines
3. Master teaching and technical skills
4. Develop, manage, evaluate, technology program

Standard 12: develop abilities to use and maintain technological products and systems

5. Develop attitudes, knowledge, and skills in technology education

The Interstate School Leaders Licensure Consortium: Standards for School Leaders has framed the design for leadership standards in two ways. First, the reliance on the research linkages between educational leadership and productive schools, and secondly, the investigation of significant trends in society and education that hold implications for emerging views of leadership (ISLLC, 1996).

ISLLC was established in 1994, and is a consortium of thirty-two education agencies and thirteen education administration associations. The purpose of the ISLLC Consortium is to provide a way for states to cooperatively develop standards, assessments, professional development, and licensing procedures for school leaders. There are six standards.

Standard 1

A school administrator is an educational leader who promotes the success of all students by facilitating the development, articulation, implementation, and stewardship of a vision of learning that is shared and supported by the school community.

Standard 2

A school administrator is an educational leader who promotes the success of all students by advocating, nurturing, and sustaining a school culture and instructional program conducive to student learning and staff professional growth.

Standard 3

A school administrator is an educational leader who promotes the success of all students by ensuring management of the organization, operations, and resources for a safe, efficient, and effective learning environment.

Standard 4

A school administrator is an educational leader who promotes the success of all students by collaborating with families and community members, responding to diverse community interests and needs, and mobilizing community resources.

Standard 5

A school administrator is an educational leader who promotes the success of all students by acting with integrity, fairness, and in an ethical manner.

Standard 6

A school administrator is an educational leader who promotes the success of all students by understanding, responding to, and influencing the larger political, social, economic, legal, and cultural context.

The International Society for Technology in Education Standards Project

identify standards for advanced programs in educational computing and technology leadership. The prerequisites for advanced degrees include:

1.0 Foundations

- 1.1 Basic Computer/Technology Operations and Concepts
- 1.2 Personal and Professional Use of Technology
- 1.3 Application of Technology in Instruction

2.0 Specialty Content Preparation in Educational Computing and Technology Literacy

- 2.1 Social, Ethical, and Human Issues
- 2.2 Productivity Tools
- 2.3 Telecommunications and Information Access
- 2.4 Research, Problem Solving, and Product Development

3.0 Professional Preparation

- 3.1 Teaching Methodology
- 3.2 Hardware and Software Selection, Installation, and Maintenance

4.0 Specialty Content Preparation for Educational Computing and Technology Leadership

- 4.1 Research and Theories
- 4.2 Instructional Design and Product Development
- 4.3 Information Access and Delivery
- 4.4 Operating Systems
- 4.5 Software and Hardware Selection, Installation, and Maintenance

5.0 Professional Preparation in Educational Computing and Technology Leadership

- 5.1 Instructional Program Development

5.2 Teaching Methodology

5.3 Staff Development

5.4 Facilities and Resource Management

5.5 Managing the Change Process

5.6 Field Experiences (ISTE, 1996)

New Jersey Department of Education Vision and Benchmarks by 2002

1. Educational technology will be fully infused into the schools' curriculum and instruction, thus significantly enhancing students' ability to achieve the Core Curriculum Content Standards. For example, computers will be integrated into all classrooms for instructional purposes, rather than maintained solely in a computer laboratory environment.
2. All Counties will continue to implement and update plans...
3. All local school districts will continue to implement and update biennially their local technology plans...
4. All teachers will have the skills and knowledge needed to use educational technology as an effective tool to support achievement of the Core Curriculum Content Standards. The state's system of Educational Technology Training Centers will continue to offer the highest quality professional development opportunities for educators in cooperation with additional local preservice and inservice training.
5. All classrooms will have fast and reliable Internet access...
6. All school districts will have high quality, highly informative user friendly websites...

7. All districts, schools and classrooms will be connected to high speed voice, video and data networks...
8. All school building will have the equipment and infrastructure necessary to provide distance learning for all students...
9. The multiple learning distance networks throughout the state will be connected and will therefore, be able to communicate with each other freely...
10. The ratio of multi-media computers will be 1 to 5...
11. All teachers will have e-mail
12. All educators and students will have access to effective and engaging software...
13. All school districts will have the equipment necessary to access satellite transmissions...
14. All school construction projects (new and retrofitting) will include a backbone distribution system, communications outlets in each room, and writing closets...
15. Schools will have educational technology coordinators in the following ratios: one for each high school, one for each middle school and one for each three elementary schools...(Vision and Benchmarks by 2002, 2002).

Professional Development

Regarding The Culture of the School and Professional Development, Fullan (1995) suggests that "professional development is currently limited because it is seen as and experienced as separated events, as though teacher's learning can be segmented from their regular work. Research on collaborative school cultures shows clearly that learning is built-in to the day to day interactions among staff who are preoccupied with continuous learning." Nias, Southworth, and Campbell (1992) studied five primary schools in

England. The themes Nias et al discuss confirm as well as shed additional light on the key factors related to continuous improvement. "Four themes stand out in the investigation of Nias and colleagues: (1) the central importance of teachers' learning, individually and in relation to colleagues; (2) how changes in teachers' beliefs and practices toward sharing evolve over time and how independence and interdependence coexist in dynamic tension; that is, conflict is normal; (3) how working conditions for continuous learning and continuous development of a whole-school curriculum inhibit or facilitate the process; and (4) the inevitability of complexity, unpredictability, and constant shifts both within the school and in the external policy environment" (p. 258).

On professional development Kalmon (1999) states "Teachers are for the most part, still expected to learn on their own time, away from the work context in which the new knowledge needs to be applied. The primary modality continues to be the workshop, a class, or a series of three or four classes, that lasts for a few hours and then is usually heard no more. These isolated learning strategies rarely have any lasting impact—other than to make teachers cynical about in-service learning. They have not been proven to be effective methods for helping teachers learn to use and apply technology tools".

Hawkins and Honey (1993), suggest that simple motivation and short-workshop themes are vastly insufficient to enable both veteran and new teachers to integrate technology into instruction.

Under the right conditions, such as some workshop settings, training-based staff development approaches can be useful in delivering to teachers certain types of information about teaching techniques or technology use. Well designed workshops and courses which offer depth and focus, provide adequate opportunities for practice, involve

doing real work, provide opportunities for consultation, and make possible follow-up classroom consultation, can be effective in imparting new skills to teachers (Little, 1993).

In order to better prepare teachers to assist students' achievement of the Core Curriculum Content Standards, administrators and community leaders must be aware and supportive of the professional development activities essential to this goal (CEO Forum on Education and Technology, 1999).

Renyi (1998) suggests that the greatest gains in teacher learning occurs when the entire educational community reflects on student results. The goals and objectives of teacher learning are derived from student results. Effective professional development occurs under the following circumstances:

> (1) Finding time to build professional development into the life of the school through flexible scheduling and extended blocks of time when students are on vacation; (2) Helping teachers assume responsibility for there own professional development based on students' needs, professional standards, parent input, and peer review; (3) Finding common ground with the community through vision statements, business and community partnerships, technological support, federally funded institutes, and use of community resources; and (4) Finding the revenues to support high-quality professional development by pooling state and district resources and finding ways to measure the effectiveness of such expenditures. Renyi (1998, pg. 7).

Tillema and Imants (Guskey and Huberman, 1995) indicate that "training" in educational professional development has acquired negative connotations.

"Teachers need to be able to analyze and reflect on their practice, to assess the effects of their teaching, and to refine and improve their instruction" (Darling-Hammond 1997 pg. 2). "Growth and competence, from this perspective (reflection), can only be established within the cultural milieu of teaching itself through a (re)construction of knowledge in real life situations, where teachers learn from their own experiences or from one another" (Guskey & Huberman 1995 p.135).

Valli (1994) suggests professional development schools should be constructivist, metacognitive, scholarly, interactive and communitarian, problem-focused, multicultural and inclusive, empowering, and social reconstructionist.

Gilford (1996) suggests that professional development should "stimulate and support site-based initiatives...Support teacher initiatives as well as school or district initiatives...Grounded in knowledge about teaching...Model constructivist teaching...Offer intellectual, social and emotional engagement with ideas, materials and colleagues...Demonstrate respect for teachers as professionals and as learners...Provide for sufficient time and follow-up support...Are accessible and inclusive" (pp. 19-20).

Darling-Hammond (1998) suggests that the re-institution of professional development schools would have a positive effect on the achievement of the new standards. The research from standards-driven states shows: (1) Test scores are generally low on the first assessment relating to new standards; (2) Failure breed success on subsequent tests- educators align curriculum with the test; (3) Districts spend more money on student remediation, student test-taking skills, and faculty preparation for new assessments; (4) Despite rising test scores there is little or no evidence of increased

student learning (Brooks & Brooks, 1999). The development of a professional school with the sole purpose of increasing scores is educationally unsound. As witnessed in Europe and Asia, building on existing practices and sound curriculum develops a consistent and productive educational system.

Darling–Hammond (1998) suggests that progress in teacher learning is most evident when research and inquiry occurs in context with real students. This professional school model has been used by Horace Mann in 1887 and John Dewey at the turn of the century. For many years after the laboratory schools were initiated by Mann and Dewey, their primary function was the education of student teachers. This may have contributed to the downfall of the professional school. Student teachers completed their education in the public school classroom, therefore making professional schools unnecessary. In 1948 the American Association of Teachers Colleges recommended decreasing student teacher participation in professional (laboratory) schools. The AACT suggested that professional school become centers for research and experimentation, so that laboratory schools served primarily as sites for observation, participation, and curriculum development. The AACTs recommendation that research and experimentation be increased was not followed.

Darling-Hammond (1998) sites various examples of professional schools being utilized today. Although the European schools are well in advance, American schools are using graduate courses, 5 year models, and partnership school models to prepare prospective teachers. Pre-service teachers in Maryland were involved in such a partnership program after the Maryland Higher Education Commission mandated that

"every teacher candidate...do an extensive internship in a specifically designed Professional Development School" (Neubert & Binko, 1998 p. 44).

The internship in the Maryland professional development project focused on three outcomes associated with classroom teaching: classroom discipline, use of technology, and reflection. The pre-service teachers were guided through internship using a hospital teaching model. The teacher of the internship course, generally a college professor, would begin by reviewing the focus of the day, followed by classroom visitation, and end with a reflective discussion. After completion of the internship, the pre-service teachers were placed in schools where they were observed and evaluated. For control purposes, a pre-service teacher who did not complete the internship program was placed in the same school as the professional development student. The results of the study indicated that the professional development pre-service teacher measured markedly better in the desired outcomes than the non-professional development pre-service teacher (Neubert & Binko, 1998). Eisner (1995) suggests that the public schools are better equipped to provide professional development; teachers know what teachers need.

Professional Development for Administrators

Literature in the field of administrative technology training and use suggests the need for additional research (Bozeman & Spuck, 1991; Samuels & Holtzapple-Toxey, 1987). In a survey of over eighty doctoral educational administrative programs, Spuck and Bozeman (1988) found only twenty percent to thirty percent required administrative computing courses. The respondents description of administrative computing, according to the researchers, was "ill-defined and lacked a practical or research-based body of knowledge" (p. 229). "Nation-wide preparation is not meeting the needs of the school

administrators in the area of computer technology and information management" (Crouse, 1994).

New Jersey Educational Leadership Institutes for Technology in Education (NJ ELITE, 2001) is a professional development initiative for school administrators funded by a grant from the Bill and Melinda Gates Foundation's State Leadership Development Plan. The institute is intended to assist school administrators in the utilization of technology in their administrative tasks and support teachers in their use of technology to enhance student learning.

Technology Leadership Competencies

There is a link between an administrator's ability to make informed decisions about school technology and their personal use of technology, however there is a small percentage of administrators who are becoming more technologically literate (Trotter, 1997).

> "Technology leaders require knowledge in the area of planning, designing, and evaluating technology and staff development programs. The technical aspect of the position requires knowledge and skills pertaining to information access tools that can support curriculum and instruction. Having the ability to evaluate, troubleshoot, install, and maintain computer operating systems, software, and hardware that support classroom and administrative needs is also a top priority. The bottom line is that the technology leader needs to be very knowledgeable about curriculum and instruction in addition to having the skills to implement and maintain a variety of technologies and network systems" (Ford, 2000 p. 91).

The CEO Forum on Technology and Education (2001) states that administrators can respond to the demands of various constituencies through the effective use of technology, and demonstrate:

1. improved ability to make data driven decisions
2. improved ability to meet student needs
3. improved ability to define student objectives and measure performance against them
4. improved ability to manage school business practices
5. improved communication with key constituencies

Scarpa (1998) indicates that technology competencies vary in their level of importance. Vision, staff development, and communication skills are essential competencies, while integration into organizational culture, support, and adequate funding are very important. Leadership practices are very important for educational administrators who implement technology in their organizations, however a low level of technology competency may not be critical to the technology change process. The competencies deemed not essential to administrative effectiveness in technology implementation are software, hardware, and terminology.

Kline (1993) ranked the importance of competencies by technology leaders as:

1. Resource Management and/or Administration
2. Selection and Utilization/Integration
3. Historical/Social Impact
4. Technical
5. Systems Approach to Instructional Design
6. Library/Information Science

7. Research
8. Interactive/Multimedia
9. Mass Communication
10. Evaluation of Media and Computers for Instruction

"Technology Enriched Administrators", a document made available by the Virginia Department of Education, recommends the following for the role of technology in administration:

1. Collecting, Organizing, and Analyzing Data
2. Using Data to Make Informed Decisions
3. Using Programs to Allow for Efficient Data Collection and Communication
4. Using Technology to Enhance Communication with Students , Teachers, Parents, Community Members, and Officials
5. Using Programs that Facilitate Scheduling
6. Understanding the State Department Role

(Virginia Department of Education, 2000)

The technological skill level of administrators has long been over-looked while emphasis had been placed on student technology use and standards. Only recently has the need for administrative technology skills, or competencies, been attributed to the success of technology programs. The technology skills of the administrator is fundamental to the following administrative responsibilities:

1. Helping create a shared vision and philosophy for the school
2. Communicate regularly and effectively to staff, parents, and community
3. Directing long- and short-term planning efforts

4. Creating and controlling budgets
5. Selecting personnel
6. Evaluating programs and staff

(Johnson & Bartleson, 2001).

In the most recent article to date, Johnson and Bartleson (2001) have combined the Technology Standards for School Administrators (TSSA) with the Rubrics for Leadership (Johnson & Bartleson, 1999) to underscore the importance of technology skills for school administrators. The Rubrics for Basic Administrative Technology Use include the following topics:

1. Personal Productivity
7. Information Systems Use
8. Record Keeping and Budgeting
9. Data Use
10. Communications and Public Relations
11. Online Research and Professional Development
12. Teacher Competencies
13. Student Competencies
14. Envisioning, Planning, and Leading
15. Ethical Use and Policy Making

(Johnson & Bartleson, 1999).

Baird (1995) suggests that the knowledge, skills, and attitudes of coordinators of technology can be grouped into four domains. The "Functional Domain" represents the knowledge, skills, and attitudes which help educational leaders function effectively in

their job. The "Programmatic Domain" represents the knowledge, skills, and attitudes which enable technology coordinators to plan and implement effective programs of instruction. The "Contextual Domain" includes the knowledge, skills, and attitudes which a technology coordinator must possess to deal effectively with the school and community environment. The "Personal/Interpersonal Domain" includes the knowledge, skills, and attitudes which a technology coordinator must possess to be effective in working with others. Competencies for each of the domains include:

1. FUNCTIONAL DOMAIN

Problem-Solving and Decision Making

Management Resource

Organizing for Change

Research, Program Evaluation, and Assessment

2. PROGRAMMATIC DOMAIN

Supervision

Staff Development

Curriculum

Instruction

3. CONTEXTUAL DOMAIN

Law and Public Policy

Technology

Public Affairs

4. PERSONAL/INTERPERSONAL DOMAIN

Personal Development/Reflective Practice

Communication (Baird, 1995)

Principals of technology-rich schools feel strongly about the use of skills in word processing, electronic mail, World Wide Web navigation, World Wide Web search, spreadsheet, and presentation. Principals of technology-rich schools feel less strongly about the skills or use of desktop video tools and statistical software (Peterson, 2000). The Peterson (2000) study found that only 15% of respondents/principals of technology-rich schools, who were reportedly World Wide Web savvy, responded to the online questionnaire. Eighty-five percent used the paper version. The low technology responses raises questions about the perception administrators have regarding their technology skills. The following items are Peterson's (2000) level of importance of technology skills:

1. Word Processing Applications
2. Database Applications
3. Spreadsheet Applications
4. Electronic Mail Applications
5. Presentation Applications
6. Desktop Publishing Applications
7. World Wide Web Navigation Software
8. World Wide Web Search Engines
9. Statistical Applications
10. Desktop Video Conferencing Equipment
11. Class Scheduling Applications

"School principals' roles and responsibilities are very complex and vary widely; for today's schools, they include technology-related knowledge. In general principals find technology skills extremely important, but at the very least, they must have an understanding of how technology fits into the school environment" (Peterson, 2000 p. 66).

Ford (2000) indicated that ninety-five percent of technology coordinators or administrators reported technology skills and knowledge was acquired through self-directed learning. The level of importance of skills and knowledge (competencies) in rank order were staff development, instructional program development, operating systems, software hardware selection, installation and maintenance.

Values

McFarland, Senn, & Childress (1996) indicate that successful leaders repeatedly mention that winning shared values include: Integrity and Honesty, Empowering Leadership, Openness and Trust, Teamwork and Mutual Support, Caring, Openness to Change, Quality Service and a Customer Focus, Respect for the Individual and for Diversity, Winning and Being the Best, Innovation, Personal Accountability, A 'Can-Do' Attitude, Balance in Life, Community Involvement and Social Responsibility.

Lewis (1990) identifies six modes by which we develop and choose values, and arrive at knowledge. "Human beings cannot separate the way they arrive at values from the values themselves. Authority, deductive logic, sense experience, emotion, intuition, and science are modes or techniques of moral reasoning but by adopting and emphasizing one over the other we turn them into dominant personal values" (p. 14).

The Malcolm Baldrige National Quality Award Program describes the core values and concepts as a framework on which the Education Criteria for Performance Excellence Goals are built. The Baldrige principals are behaviors that are based on a results-oriented framework found in high-performing organizations. The values and concepts embedded in the Education Criteria for Performance Excellence Goals are:

1. Visionary Leadership
2. Learning-Centered Education
3. Organizational and Personal Learning
4. Valuing Faculty, Staff, and Partners
5. Agility
6. Focus on the Future
7. Managing for Innovation
8. Managing by Fact
9. Public Responsibility and Citizenship
10. Focus on Results and Creating Value
11. Systems Perspective (Baldridge National Quality Program, 2001)

Technology-Rich Environments

> "The move away from the traditional classroom is influenced by a number of recent developments outside the call for education reform such as new developments in telecommunications, increased use of the Internet, proliferation of affordable hardware and software, and growing acknowledgment among policy makers that proper use of technology has the potential to improve teaching and learning. A variety of excellent programs are in operation, which demonstrate that technology-

rich schools result in richer classroom content, higher student achievement, lower dropout rates and improved attitude and enthusiasm for learning" (Charp, 1999, p. 1).

Teachers working in an information age need to develop facility with a range of technology tools. These technologies can be powerful tools in helping teachers enhance instruction, simplify administrative tasks, and improve communication to foster professional growth. Yet "there is no single best technological medium that suits all teachers equally well, and There does not appear to be one best way for teachers to implement technology" (Office of Technology Assessment, 1995, p. 57). Teachers need to know what resources are available to them, how to use the technologies for their own use and instructional purposes, and they need access to the technologies to become more proficient with the medium of their choice (OTA, 1995). Teachers also need to have access to personnel who's familiarity with technology and learning environments will enable them to successfully integrate technology into the classroom (Riedi et al, 1998).

Maddox (1991) suggests the conditions necessary for meaningful integration of computer technology are: availability of excellent software in all content areas; sufficient access to computers and necessary hardware in individual classrooms; and teacher interest and expertise in educational computing.

The effectiveness of technology in education is becoming more evident through empirical studies. The technology phenomenon is encouraging educators and districts to provide greater access and availability to technological resources (Charp, 1998)

More than $5 billion is invested annually in learning technology, representing federal, state, and local funds. Yet, from 1994 through 1998, schools with low numbers of minority students were three times more likely to have Internet access in classroom

settings than schools with schools with high numbers of minority students, Similarly, high income schools were twice as likely to have Internet access in classrooms as low-income schools (National Center for Educational Statistics, 1998). This trend, combined with the widening gap between information technology industries and the total private sector, suggests that the digital divide in the United States is not going away.

An independent research consultant (Rockman, San Francisco) followed students with continuous access to notebook computers. The consultant reported significant learning with student and teacher accomplishments in both skill development and critical thinking (Charp, 1999).

Teachers who have five or more computers in the classroom are more likely to give frequent computer assignments even when the computer lab holds fifteen or more computers. Even when the number of in class computers falls below five, teachers who have convenient access to computers will be more likely to use them frequently (Becker, Ravitz, & Wong, 1999).

The United States Department of Education (2001), in the *Report to the Nation in Technology and Education—Getting Students Ready for the 21st Century,* underscore the essential ingredients in successful technology-rich schools:

1. Role of concentrated, conscious and explicit planning among school leaders, families and students to create "learner-centered environments."
2. Goals and challenging standards for student achievement are clearly articulated.
3. Restructuring of the school to support the learner-centered environment and achievement of standards.
4. Near universal access to computer technology.

The Milken Exchange on Educational Technology has developed a framework of progress indicators that are essential conditions for technology-enriched learning opportunities. The *Seven Dimensions for Gauging Progress* represents a synthesis of the work of professionals and scholars in the field such as Dr. Thomas Boysen, Dr. John Schacter, and others. While this work remains untested, it provides insight into the complex and interdependent elements that necessitate the effective implementation and development of technology-rich environments. The *Seven Dimensions of Gauging Progress* Consist of:

1. Learners
2. Leaning Environments
3. Professional Competency
4. System Capacity
5. Community Connections
6. Technology Capacity
7. Accountability

(Mlken Exchange on Educational Technology, 1998).

> "Educational technology is a valuable tool to achieve educational objectives. Particularly when combined with the other key factors that increase student achievement, such as clear measurable objectives, parental and community involvement, increased time spent on task, frequent feedback and teacher subject matter expertise, technology can help deliver significant and positive results" (CEO Forum on Technology and Education, 2001, p. 5).

Means and Olson (1994) suggests as with all successful forms of school reform, technology integration shows that "the chances for success are increased when all educational stakeholders buy into the instructional goals of the reform.

Dede (1997), suggests that universal improvements in education through technology innovations "can take place only within the larger context of systemic reform—sustained, large scale, simultaneous innovations in curriculum, pedagogy, assessment, professional development, administration, incentives, and partnerships for learning among schools, businesses, homes, and community settings" (p. 1). Distributed learning involves orchestrating educational activities among classrooms, workplaces, homes, and community settings (Dede, 1996).

Anderson and Dexter (2000), report that one of the most important technology leadership attributes is the formation of technology committees.

Involvement of the community and family in the formal education of their children result in better grades, higher test scores, academic achievement, more appropriate attitudes and behavior (Payton, 2002).

The CEO Forum on Technology and Education (1999) states that teachers in High Tech schools have technology integrated in the classroom environment. This enables students to develop a technological repertoire suitable for research and problem solving beyond the capabilities of low tech or the no tech environment. Apple Computer's Classrooms of Tomorrow (ACOT) program suggests that students in High Tech environments become independent and collaborative problem solvers, theorists, communicators, record keepers and learners with their computers. Teachers report the greatest problems with High Tech environment is the lack of technical support.

The CEO Forum on Technology and Education (1999) sites the following criteria for "Target Schools":

1. Ubiquitous access to modern computers: There are about 3 students per computer and about 4 students per multimedia computer.
2. New Technology: About 72% of all computers have processors equal to or greater than an Intel 386. There are about 9 students per CD-ROM player.
3. Nearly ubiquitous Internet access: 93% of schools have Internet access.
4. Prevalent network computers: Only 16% of these schools do not have a LAN. There are about 7 students per computer connected to a LAN (CEO Forum on Technology and Education, 1999).

The "Four Pillars" for improving education through technology, as defined by the Clinton/Gore Administration, are addressed by the CEO Forum on Technology and Education in Years 1,2, and 3 of the StaR Report. The four pillars are:

1. Hardware
2. Connectivity
3. Software and Content
4. Professional Development

Technology Integration

Educational administrators have given little attention to the integration of technology in the schools (Telem, 1993). Studies on technology integration in schools conducted by Marco International indicate that effective leadership is essential to the integration of technology (Livesay & Murray, 1992). The impetus for a technology

initiative is often a visionary superintendent or school principal. It is that person who will lead the development of a shared vision for school improvement.

Costello (1997) suggests that technology leaders need to address the following issues in order to realize the full potential of technology integration: Creating a Vision, Monitoring Influence, Funding, Involving Staff, and Creating Standards.

Polles (1999) suggests that achievement has no relationship to technology presence. However, the appropriate use of technology is to promote innovation toward school improvement (Donavan, 1999). School leaders need to assure the staff that the goal of technology is to enhance instruction- not to replace it. Donavan (1999) suggests that full integration must embody the following characteristics: (1) be advantageous to current methods, (2) be compatible with needs and expectations, (3) be simple to use, (4) be easily tried without a huge commitment to change, and (5) be observable and modeled by staff who embrace technology.

Studies on technology integration conducted by Macro International suggests that one of the most important factors related to the successful integration of technology is effective leadership (Livesay & Murray, 1992).

Research suggests that technology use in the classroom is more effective if the classroom teacher receives training, if there is district support, and if they have a network of other computer-using teachers to share experiences with (Wellburn, 1996).

Technology generally takes about four to five years to be seamlessly integrated with traditional instruction. This requires a commitment to professional development and technical support (Sheingold & Hadley, 1990).

Hannafin and Savenye (1993) suggest possible reasons for teachers resistance and non-use of computers in the classroom include: un-supportive administrators, increased time and effort required of the teacher, doubt that computers improve learning outcomes, poorly designed software, resentment of the computer as a competitor for students' attention, and fear of losing control of center stage.

Dwyer et al., (1991), suggests that teachers instructional philosophies change with the use of technology. They become more experimental, student-focused, and collaborate with other technology using teachers.

While a technology-rich environment is defined primarily by a list of technology and applications, the literature consistently stresses the importance of "how" the technology is used. Less than three percent of schools are at the leading edge of effectively integrating technology into classroom practices. Schools that have and use technology number approximately twelve percent, however those schools are not devoting adequate time and resources for curriculum integration (Byrom, 1998).

The most effective way for school leaders to show teachers the benefits of technology integration, is to engage them in developing a shared vision of school improvement (Byrom, 1998). School improvement that is articulated in the district technology plans will indicate to staff members reasonable expectations for success (Means & Olson, 1994).

Researchers of the Apple Classrooms of Tomorrow (ACOT) identified five stages of technology integration, or teacher technology adoption, as referred to in the CEO Forum's Year 2 School Technology and Readiness Report (StaR) Report. At the first stage, entry, teachers are not the technology users. Technology instruction is most likely

provided by a computer instructor, and in a computer lab. Classrooms may have computers with limited software or educational "games". At the second stage, adoption, teachers use technology to support traditional instruction. Teachers are limited in use, but begin to see the potential and power of technology. At the third stage, adaptation, teachers use technology to enrich curriculum. Teachers begin to use technology in ways that connect to the curriculum. Teachers tend to direct student inquiry rather than coach student-directed learning experiences. At the fourth stage, appropriation, technology is integrated and used for its unique capabilities. Learning experiences are designed technologically to meet objectives and desired outcomes. Students master more higher-order thinking skills and complex concepts with technological integration. Students may choose their own presentation tools. At the fifth stage, invention, teachers discover new uses for technology. Teachers redefine the classroom environment through technologically achieved higher-order thinking skills and complex concepts. An example might be a technologically based class project that has real-life results or implications (CEO Forum on Education and Technology, 1999).

Teachers who participated in the ACOT studies developed both traditional and non—traditional learning and teaching. It was noted by Dwyer, (1994) that students experienced more peer collaboration and teachers used experimental methods due to administrators flexibility in changing the classroom environment and rearranging schedules to accommodate different pattern of teaching and learning.

The CEO Forum on Education and Technology (2001) recommends that both federal and state policy provide for basic technology literacy for all students. "We must also ensure that our children have the ability to move beyond basic

> skills to apply higher order problem-solving skills that will be needed to compete in the new and ever changing information economy. Students must be able to use technology's tools to enhance learning; increase productivity; promote creativity; research topics online; proficiently use web-based tools; evaluate sources; develop problem solving strategies; and incorporate technology into their course-work" (p. 6).

Hopson, Austin, Simms, and Knezek (2002) suggest that the creation of technology-enriched classroom has a positive effect on students acquiring higher-order thinking skills.

> A shift in instruction occurs from teacher-directed to student-oriented learning when technology is employed (SEIR*TEC, 2000). "Exploratory technology combines some content with a particular delivery strategy to encourage students to explore a subject and construct their own knowledge. The majority of exploratory technology applications are open-ended and can produce a variety of narrative outcomes. The primary goal when using an exploratory technology is not to get the right answer but rather to use the technology to engage with a subject and derive meaning from that engagement" (p. 68).

Higher proportions of teachers use computers on a regular basis who have even small numbers of computers in their classrooms. The computer in the classroom seems to be a more valuable tool to find, analyze, and communicate information even when the teacher has access to the computer lab with considerably more computers (Becker, Ravitz, & Wong, 1999).

Becker, Ravitz, and Wong (1999) report that along with several other groups of teachers, elementary teachers are more apt to use computers with their students on a regular basis. However, more elementary teachers frequently make use of game and drill software. Generally, 50% of teachers' students use word processing, 36% use CD-ROM reference software, and 30% of all teachers have students use the World Wide Web. The most used programs and software title mentioned by teachers are: Microsoft Works, Netscape, Accelerated Reader, Hyperstudio, and Geometer's Sketchpad.

> "Founded in 1996, the CEO Forum on Education & Technology is a unique four year partnership between business and education leaders who are committed to assessing and monitoring progress toward integrating technology in America's schools. The CEO Forum hopes to ensure that the nation's students will achieve higher academic standards and will be equipped with the skills they need to be contributing citizens and productive workers in the 21st century" (CEO Forum on Education and Technology, 2000 p.1).

The Curry Center for Technology and Teacher Education (2001), has adapted the following levels of technology use in the classroom for use in the Virginia Department of Education's Technology Enriched Administrators. The levels are:

1. Nonuse- A perceived lack of access to technology-based tools or lack of time to pursue electronic technology implementation. Existing technology is predominately text-based.

2. Awareness- The use of computers is generally one step removed from the classroom teacher (computer labs). Computer-based applications have little or no relevance to the individual teacher's instructional program.

3. Exploration- Technology –based tools serve as a supplement to the existing instructional program. The electronic technology is employed either for extension activities or for enrichment exercises to the instructional program.

4. Infusion- Technology-based tools including databases, spreadsheets, graphing packages, probes, calculators, multimedia applications, desktop publishing, and telecommunications augment selected instructional events.

5. Integration (mechanical)- Technology-based tools are mechanically integrated, providing a rich context for student understanding of pertinent concepts, themes, and processes. Heavy reliance is laced on pre-packaged materials and sequential charts that aid the teacher in the daily operation of the instructional curriculum. Technology is perceived as a tool to identify and solve authentic problems relating to an overall theme or concept.

6. Integration (routine)- Teachers can readily create integrated units with little intervention from outside resources. Technology-based tools are easily and routinely integrated, providing a rich context for students' understanding of the pertinent concepts, themes, and processes. Technology is perceived as a tool to identify and solve authentic problems relating to an overall theme/concept.

7. Expansion- Technology access is extended beyond the classroom. Classroom teachers actively elicit technology applications and networking from business enterprises, government agencies, research institutions, and universities to expand student experiences directed at problem solving, issues resolution, and student activism surrounding a major theme or concept.

8. Refinement- Technology is perceived as a process, product, and tool for students to use in solving authentic problems related to an identified real-world problem or issue. In this context, technology provides a seamless medium for information queries, problem solving, and product development. Students have ready access to and a complete understanding of a vast array of technology-based tools to accomplish any particular task.

The presence of technology is not necessarily indicative of the effective use of technology. Complex sets of factors are in place where technology plays a key role in educational problem solving (Hawkins, Spielvogel, Panush, 1998). The National Study Tour of District Technology Integration suggests that complex sets of factors change along with the introduction of technologies. The Education Development Center, Inc., Center for Children and Technology examined the various models of technology integration from eleven school districts. The key factors affecting the integration of technology are as follows:

1. Leadership
    a. High level, distributed and coordinated
    b. Specific vision of good education
    c. Long term & consistent course of integration
    d. Recognize scope of the problem
2. Purpose
    a. Clear links between education/r5eform purposes and technology
    b. Emphasis on student work and student use
    c. Control of the narrative
3. Organized Growth and Experimentation

a. create and learn from local test-beds

b. invest in lower grades and expand upward

4. Design for Infrastructure

a. whole buildings or groupings

b. roles of specialists

c. physical space: mixed models

d. deep and reliable technical back-up

e. Small communities of conversation

f. Most of the districts are on the cusp of systemic networking, and that is creating new challenges for them.

5. Professional Development

a. Substantial investment in growing human capacities

b. Recruit from and make commitment to those in community for both technical support and professional development

c. Similar to leadership development rather than technical skills training

d. Technology is a key feature in district hiring and career ladders

6. Community Connections

a. Strategies for active community involvement

b. Technology used to attract parent and local business volunteers

c. Develop technology facilities for community use

d. No (or few) mixed messages

7. Software Selection

a. Emphasis on consistent and powerful suite of applications and tools

b. Rich reservoir of accessible curriculum materials

c. Strategy for keeping abreast of developments

8. Finance

a. Coordinated budgeting for essential components

b. Financing options

c. Individual grants as coordinated building blocks

(Hawkins, Spielvogel, & Panush, 1998).

The SouthEast and Islands Regional Technology in Education Consortium (SEIR*TEC) provides an on-line instrument to determine the status of five areas or domains impacting technology integration. The five domains are (1) student engagement, (2) teacher engagement, (3) availability and accessibility of appropriate resources, (4) organizational support, and (5) community involvement (SEIR*TEC, 2000). The SEIR*TEC (2000) integration instrument is intended to provide a profile of the level of technology implementation. The information is provided by the principal or school official. The first item, level of student engagement, questions the level of higher order thinking skills supported by technology, and the students' achievement of the school's expectations of technology use. The second item, environment for teacher engagement, questions the design and implementation of technology-based learning experiences, the expected level of technology use (from the ACOT Study), and the integration of technology into all subject areas. The third item, availability and accessibility of appropriate resources, questions the availability of technology resources to support a variety of student and teacher experiences, the allocation of technology resources to support the constructive use in teaching and learning, and the equitable

access to technology. The fourth item, organizational support, questions the structure that exists for the support of all aspects of technology integration, transformational leadership, policies that support the equitable availability and use of technology, effective and ongoing staff development, and the use of technology as a management tool. The fifth item, community involvement, questions the community support of technology integration, and the community's sharing of technology use (SEIR*TEC, 2000).

The Milken Exchange on Educational Technology has developed a framework to assess the learning levels of student through technology. The Seven Dimensions for Gauging Progress is a tool intended for use as:

1. A vision that will define expectations for the public investments in K-12 learning technologies;
2. A self-assessment tool that assists schools, districts and states in gauging their progress toward that vision;
3. A planning tool for strategizing how to incorporate technology and telecommunications into education in ways that improve student learning;
4. An accountability system for tracking the return on public investments in education technology; and
5. A research agenda that will help guide studies of how and under what conditions technology is an effective tool for learning.

(Lemke & Coughlin, 1998 p. 13).

The Seven Dimensions for Gauging Progress (Lemke & Coughlin, 1998), questions the following dimension:

1. Learners- Are learners using the technology in ways that deepen their understanding of the content in the academic standards and, at the same time, advance their knowledge of the world around them?

2. Learning Environments- Is the learning environment designed to achieve high academic performance by students through the alignment of the standards, research-proven learning practices and contemporary technology?

3. Professional Competency- Is the educator fluent with technology and does he/she effectively use technology to the learning advantage of his/her students?

4. System Capacity- Is the education system reengineering itself to systematically meet the needs of learners in this knowledge-based, global society?

5. Community Connection- Is the school-community relationship one of trust and respect, and is this translating into mutually beneficial, sustainable partnership in the area of learning technology?

6. Technology Capacity- Are there adequate technology, networks, electronic resources and support to meet the education system's learning goals?

7. Accountability- Is there agreement on what success with technology looks like? Are there measures in place to track progress and report results?

Technology Assessment of Instructional Staff

Research on teaching and learning in technology-rich environments and SEIR*TEC members' experiences in technology-poor schools support the notion that educators go through incremental stages on their way to becoming technology proficient (Dwyer, Ringstaff and Sandholtz, 1991; Apple Computer, Inc., 1995; Lemke & Coughlin, 1998). Research and experience also indicate that teachers and

administrators need support from school and district leaders as they go through the stages. "As teachers try new strategies and adopt new technologies, they are bound to stumble; it is up to the principal to assure them that it is okay to be less than graceful as they are learning" (Byrom & Bingham 2001, pp. 4-5).

The perspective of educational leaders indicates that under-utilization of technology in the classroom results from the following: inadequate teacher training; a lack of vision of technology's potential for improving teaching and learning; a lack of time to experiment; and inadequate technical support (OTA, 1995).

Present teacher evaluation instruments are not well suited for assisting teachers with the integration of technology in the classroom. Such evaluations typically contain general requirements or a checklist of items. Tools that may be more beneficial are self-assessments of teacher technology skills and open ended classroom observation protocols (Byron & Bingham, 2001).

Technology standards for students presently exist in thirty-six States, and nine others are in the process of development. The technological standards movement is virtually in its infancy, which makes assessment difficult at best. No states comprehensively assess technology standards across the curriculum. Forty states, at this time, have no technology assessment to determine competency for high school graduation (Milken Exchange, 1999).

Since the inception of the technology movement various indicators have been used for measurement and assessment. Attitudes toward learning and self-concept are measures that react positively in studies that compare technology and student achievement. Students who have greater access to technology, and have teachers who

are well trained in technology, generally score higher on the Stanford 9 standardized test (Schacter, 1999).

Although the studies and evaluations of the success of technology implementation with regard to student achievement are diverse and incomplete, there is a general agreement that alternative means of evaluation is necessary (Milken Exchange, 1999).

During the *Secretary's Conference on Educational Technology: Evaluating the Effectiveness of Technology* on July 12-13, 1999, the following seven critical issues in evaluating the effectiveness of educational technology emerged:

1. The effectiveness of technology is embedded in the effectiveness of other school improvement efforts.
2. Current practices for evaluating the impact of technology in education need broadening.
3. Standardized test scores offer limited formative information with which to drive the development of a school's technology program. Most schools are looking for additional means for collecting useful data for this purpose.
4. Schools must document and report their evaluation findings in ways that satisfy diverse stakeholders' need to know.
5. In order for evaluation efforts to provide stakeholders with answers to their questions about the effectiveness of technology in education, everyone must agree on a common language and standards of practice for measuring how schools achieve that end.
6. The role of teachers is crucial in evaluating the effectiveness of technology in schools, but the burden of proof is not solely theirs.

7. Implementing an innovation in schools can result in practice before policy. Some existing policies need to be "transformed" to match the new needs of schools using technology (McNabb, Hawkes & Rouk, 1999).

To realize high standards, teachers and educators need to change traditional methods of instruction and the passive means by which students traditionally receive information. More effective methods of instruction are based on engaging students in complex problem-solving activities whereby current technologies are used to deliver vastly greater informational resources into the classroom than prior, or non-technological resources were able to (Hawkins, Spielvogel & Panush, 1998).

Exemplary teachers use computers in lab settings as well as classroom settings at the school for consequential activities that is where computers are used to accomplish authentic tasks rather than busywork such as worksheets, homework assignments, quizzes or tests (Heinecke, Blasi, Milman, Washington, 1999).

Student Achievement Related to Technology

A report prepared by Interactive Educational Systems Design, Inc. concluded that "the use of technology as a learning tool can make a measurable difference in student achievement, attitudes, and interaction with teachers and other students" (Wellburn, 1996).

Gains in student achievement associated with technology initiatives and advancements are dependent on a number of variables. After an analysis and meta-analysis of over 700 empirical research studies, Schacter (1999) suggests that students with access to computer assisted instruction, or integrated learning systems technology, or simulations and software that teach higher order thinking, or collaborative networked

technologies, or design and programming technologies, "show positive gains in achievement on researcher constructed tests, standardized tests, and national tests" (p. 9).

In a milestone meta-analysis of educational technology studies, Kulik and Kulik (1991) researched the effectiveness of self-paced instructional software. The research indicated a consistent 20% improvement in learning outcomes in mathematics and grammar that "few other teaching methods have demonstrated such consistently strong results" (Ehrmann, 1995).

"Education technology can help improve student achievement. Studies and research indicate that the impact of technology proves most powerful when focused on specific, measurable educational objectives, such as improved literacy. In addition, students demonstrate higher levels of motivation and engagement when using technology, which also contributes to improved achievement" (CEO Forum on Education and Technology, 2001). The CEO Forum on Education and Technology (2001) determined that technology can help:

1. Improved scores on standardized tests
2. Increased application and production of knowledge for the real world
3. Increased ability for students to manage learning
4. Increased ability to promote achievement for special needs students
5. Improved access to information that increases knowledge, inquiry and depth of investigation

To ensure technological effectiveness, implementation of the building blocks for student achievement must be employed. The key building blocks for student achievement are alignment, assessment, accountability, access, and analysis. A study by

Achieve indicated state standards and tests are not closely enough aligned, and in most cases measure only some of the standards and tend to focus on the less demanding and simpler skills (CEO Forum on Education and Technology, 2001).

The West Virginia study conducted by Dr. Dale Mann of the Teachers College at Columbia University investigated the nation's longest running (ten year) program of technology implementation. The objective of the West Virginia Basic Skills/Computer Education (BS/CE) program was to increase the level of basic skills and provide comprehensive teacher training on computer utilization in the classroom. Cheryl Lemke, executive director of the Milken Exchange, states that West Virginia's BS/CE program deserves scrutiny because of its scale, consistency and focus. The issues of system design, training, technology capacity, technical support, and means of measurement are all present in the West Virginia experience, and provide important lessons for other states making investments in learning technology (Milken Exchange, 1999).

The West Virginia model was comprised of three components: access; attitude, and; training. Results of the West Virginia study suggests that higher gains on the Stanford-9 test result from increases in any and all of the three components. In the school year 1997-98, the study showed an increase of 11% in student achievement on the Stanford-9 test.

The Milken Exchange determined that a relationship exists between the appropriate use of technology and significant gains in math, reading, and language arts skills. The reasons for the success of the West Virginia BS/CE program were sited by the Milken Exchange as:

1. Rather than isolating computer skills from academic learning, West Virginia's BS/CE program integrated technology into the instructional program. In other words, the technology was a means of learning the basics, not an end in itself.
2. The report revealed that the computers inside classrooms were more effective than centralized computer labs in producing basic skills gains in students and in promoting the confidence and technological competence of teachers.
3. The report also revealed the importance of timely and comprehensive teacher training as a key factor in the success of West Virginia;s technology program (Milken Exchange, 1999).

In another study commissioned by the Milken Exchange (1999) and released through Education Week, *Technology Counts 98* sought to answer more definitively the question regarding technology and student learning. The research leader, Harold Wenglinsky, an associate research scientist from Educational Testing Service, makes it clear that the benefits of technology are dependent upon the level of training given to teachers, and how the technology is used (Archer, 1998). There have been a number of studies that indicated students who use computers do worse on math assessments, suggesting the importance of instructional correctness over instructional repetitiveness Milken Exchnge on Educational Technology, 1998).

Wenglinsky's study, "Does It Compute? The Relationship Between Educational Technology and Student Achievement in Mathematics", utilized data from 4th and 8th graders who took the math section of the 1996 National Assessment of Educational Progress. His finding suggest students who used computers for "drill and skill" purposes performed worse on the NAEP than those students who did not use computers (for that

purpose), however eighth grade student who used computers for simulations and applications (associated with higher order thinking) performed better on the NAEP than those students who did not. Fourth grade students performed better after using math/learning games, but not after simulation and application, nor drill and skill software. The common link between the test performance in both grades was professional development. The teachers who received professional development had students perform consistently better on the NAEP (Milken Exchange, 2001).

The Computers Helping Instruction and Learning Development (CHILD) study was a five year investigation in nine Florida elementary schools. In 1987, over 1400 students and their teachers received training that included technological components and team environment training. Students who were in the CHILD program for more than one year seemed to benefit the most, however standardized test scores indicated a positive and statistically significant result across al grades, schools and subjects (Kromhout & Butzin, 1993). The goals of the CHILD project were problem-solving and higher order thinking skills.

The Apple Classrooms of Tomorrow (ACOT) project was heralded as a 'conceptual environment' where students acquired, explored, and expressed ideas. As with the CHILD project, the goals of ACOT were student growth in problem-solving skills, inquiry, collaborative and technological skills. The ACOT report detailed the major barriers to the success of the project were administrative support, and the traditional assessment requirements of the education system (Wellburn, 1996).

In Union City, NJ, Project Explore enabled researchers to look comparatively at a cohort of students who had home and school access to computer technology, and a cohort

of students who had access to technology only at school. It should be noted that all the students were beneficiaries of Union City's district wide reform that included project work, critical analysis, and interpretation skills over rote memorization and practice. The impact of technology on student learning in Union City indicates that:

1. The educational reforms undertaken by the Union City district have had a substantial impact on students' standardized test performance, particularly at the K-8 level where the reforms have been in place the longest.
2. The Explore students gain a substantial "leg up" during the first year of the project, scoring significantly better than their district peers in writing and mathematics. This increase is not due to the technology alone but to increased expectations and to the dedication of teachers and administrators in ensuring that this group of students would excel.
3. Writing is one area where deep and sustained access to technology makes a difference. At the seventh, eighth, and ninth grade levels, Explore students do significantly better than their non-Explore peers on the writing portion of state tests (Chang, Henriquez, Hney, Light, Moeller, & Ross, 1998).

Summary

Elementary principals are essential and central to instructional program improvement and implementation (Fullan, 1990). As the instructional leader of the school, the principal needs the ability, skills, and knowledge to successfully integrate technology into the curriculum (Kouzes & Posneer, 1987). Successful principals are visionaries and inspire a shared vision in others Lezotte & Bancroft, 1985; Venesky & Winfield,1979; & Riedl et al., 1998).

Commitment is the complete responsibility to the vision that goes well beyond the status quo (Blumber & Greenfield, 1986; Senge, 1990).

The technology leadership standards are intended to be indicators of effective leadership for technology in schools. The most relevant set of standards for this research is the Technology Standards for School Administrators (TSSA) published by the International Society for Technology in Education (ISTE), however relevant standards can also be found in the Southern Regional Education Board's Educational Technology Cooperative, Advanced Programs in Educational Leadership (EDLEA), the International Technology Education Association (ITEA), the Interstate School Leaders Licensure Consortium (ISLLC), and the New Jersey Department of Education's Vision and Benchmarks by 2002 for Technology. A recurring theme throughout all of the technology standards is professional development.

Much of the professional development initiatives in place today are non-contextual and therefore ineffective (Fullan, 1995; Kalmon, 1999). For teachers to gain the skills necessary to integrate technology, professional development should be on-going and site-based (Hawkins & Honey, 1993; Kalmon, 1999). Bozeman and Spuck (1991) suggest the need for additional research in the field of administrative technology training.

There is a link between an administrator's ability to make informed decisions about school technology and their personal use of technology, however there is a small percentage of administrators who are becoming more technologically literate (Trotter, 1997).

"School principals' roles and responsibilities are very complex and vary widely; for today's schools, they include technology-related knowledge. In general principals

find technology skills extremely important, but at the very least, they must have an understanding of how technology fits into the school environment" (Peterson, 2000 p. 66).

Technology-Rich environments enable teachers to access computer technology in the classroom with specifications produced by the CEO Forum on Education and Technology and other educational technology professional organizations. Teachers and Administrators need access to technology equipment and software as well as personnel who's familiarity with technology and learning environments will enable them to successfully integrate technology into the classroom (Riedl et al, 1998).

The integration of technology into schools and classroom instruction is a lengthy process that requires effective leadership (Livesay & Murray, 1992; Sheingold & Hadley, 1990). The stages or levels of technology integration and usage range from minimal technology use to state of the art curriculum and instructional integration (Apple Computer, Inc., 1995; CEO Forum on Technology and Education, 2001).

Present teacher evaluation instruments are not well suited for assisting teachers with the integration of technology in the classroom. Such evaluations typically contain general requirements or a checklist of items. Tools that may be more beneficial are self-assessments of teacher technology skills and open ended classroom observation protocols (Byron & Bingham, 2001).

Student achievement, attitudes, and interaction with teachers can be positively effected through the use of technology (Schacter, 1999; Ehrmann, 1995; Wellburn, 1996).

CHAPTER III

RESEARCH METHODOLOGY

Introduction

The purpose of this chapter is to describe the subjects, materials, and procedures utilized in this study. The method will enable the researcher to describe the technology standards that relate to the actions and behaviors of elementary principals, and the technology competencies and skills that principals use. In addition, the research method will allow the principals to describe how technology is integrated into curriculum and instruction. Due to the complexity of the elementary principal position and the concepts regarding technology, the research method will allow the principal to elaborate on topics that he/she feels are meaningful.

Population

The population for this study consists of elementary principals in the state of New Jersey. The criteria for the study is (1) that the respondents are elementary principals in the state of New Jersey, (2) the respondents have sufficient tenure as to form opinions regarding technology leadership, (3) the respondents have sufficient tenure as to form opinions regarding technology integration.

Sample

In order to ensure representation of the population, eight principals have been selected from diversified district factor groups. The principals are employed in the following district factor groups: A, B, CD, DE, FG, GH, I, and J. The districts were

selected according to proximal location and DFG by utilizing the New Jersey School Directory found on the New Jersey Department of Education web site. The researcher contacted the superintendents from each of the districts by letter. Eight superintendents responded positively out of fourteen attempts. The researcher randomly selected principals from each of the districts in which the superintendent had given permission to interview an elementary principal.

Methodology

This study is an investigation of the leadership technology standards and technology skills and competencies of the principal, and further to investigate how technology integration is achieved. The use of qualitative research as a methodology will enable the principals to reveal information that might not appear on a questionnaire. Patton (1990) states that process evaluations attempt to understand the "internal dynamics of how a program, organization, or relationship operates". "Process data permit judgments to be made about the extent to which the program or organization is operating the way it is supposed to be operating, revealing areas in which relationships can be improved as well as highlighting strengths of the program that should be preserved" (p. 95).

The Research Instrument

The interview questions are self-designed and based on the current literature. They consist of the following items:

(1) The respondent's self-evaluation and comparison to the leadership technology standards and competencies available in the current literature. (2) The respondent's

evaluation of technology integration (how technology is used by teachers and students). The sections of the standardized open-ended interview are summarized in the following:

Section One. Questions 1-10 in the first section relate to the technology standards discussed in chapter two. The questions are based on a synthesis of standards based on The International Society for Technology in Education's *Technology Standards for School Administrators* (ISTE, 2001), NCATE Program Standards (NCATE, 1995), Baldridge National Quality Program's *Education Criteria for Performance Excellence* (Baldridge National Quality Program, 2001), the Southern Regional Education Board *Education Technology Cooperative* (Southern Regional Education Board, 2000), and the Interstate School Leaders Licensure Consortium: Standards for School Leaders (ISLLC, 1996).

Section Two. Questions 11-19 in the second section pertain to the technology competencies of the principal. The questions are based on a synthesis of information regarding leadership technology competencies and skills (Baird, 1995; Ford, 2000; and Peterson, 2000).

Section Three. Questions 20-29 pertain to "how" technology integration is achieved in the respective schools of the principals interviewed. This section of the interview was based on the Southeast and Islands Regional Technology in Education Consortium (SEIR*TEC, 2000), The CEO Forum for Technology in Education (2001), and the Milken Exchange on Educational Technology's *Seven Dimensions for Gauging Progress* (Milken Exchangeon Educational Technology, 1998).

Procedure

Administering the Interview The standardized open-ended interview was presented to the subjects verbally. The researcher personally conducted each interview. A tape recorder was used to record the responses of the principals. The interview had a duration of approximately forty five minutes and was administered in person, in the office of each of the principals.

Jury of Experts. In order for the interview questions to elicit the information necessary to answer the research questions, the standardized open-ended interview questions were submitted to experts in the field of educational technology and leadership.

Participant of the jury are:

1) Dr. John Collins

   Seton Hall University

   South Orange, New Jersey

2) Dr. Osborne Abbey

   Assistant Superintendent Union Township

   Union Township, New Jersey

3) Dr. Richard Charwin, Supervisor of Guidance

   Bridgewater-Raritan Regional School District

   836 Newmans Lane

   P.O. Box 6030

   Bridgewater, NJ 08807-0030

The overall consensus from the Jury of Experts speaks favorably to the interview questions' validity to correctly answer the research questions.

The interview questions as submitted to the jury contained no indication of which research question would be answered by any given interview question. The jury indicated to the researcher that a format to connect the interview questions to research questions should be established. The jury indicated which of the interview questions they believed would best answer the research questions and which questions would not. This allowed the researcher to compare the responses of the jury and determine if there was a consensus. The consensus of the Jury of Experts regarding which of the interview questions would best answer the research questions prompted the researcher to adjust the interview questions accordingly.

Additional recommendations included the reduction of interview questions to a maximum of twenty-nine. Within the group of questions there will be three major themes that directly correspond to the research questions. Within each theme will be between three to seven supporting concepts. The concepts referred to are found in chapter two under the heading of Technology Standards, Technology Competencies, and Technology Integration. The concepts are re-focused and re-defined in the design section to follow.

Design

The design of the study was qualitative and utilized standardized, open-ended interview questions.

The interview questions were designed to reflect the current literature regarding technology standards, technology competencies, and technology integration. The design of the questions prompted responses from each of the preceding themes.

The open-ended design of the interview questions allowed for much latitude and interpretation by the subject, therefore the responses were often applicable to themes other than their original intent.

Research Question 1 The researcher used the responses to the questions that pertain to technology standards to answer the following question:

1. To what extent do elementary principals relate to leadership technology standards in their professional practice?

The interview questions one through ten, question the principal's connection to leadership technology standards discussed in chapter two. The concepts that the first section addresses are vision, professional development, sharing information, and technology assessment.

Research Question 2 The researcher used the responses to the questions that pertain to the technology competencies of the principal to answer the following question:

2. What are the technology skills and competencies are used by elementary principals?

The interview questions eleven through nineteen, question the principal's technological competencies, or expertise, in nine areas. The concepts explored in the second section of interview questions are the computer and technology competencies, modeling technology use, and the principal as professional development recipient.

Research Question 3 The researcher used the responses to the questions that pertain to technology integration to answer the following question:

3. How do elementary principals integrate technology into the educational environment?

The interview questions twenty through twenty-nine, question the principal's participation in the integration of technology at the building level. The concepts that the

third section address are student and teacher engagement, technology integration, integration of classroom technology, availability and accessibility of technology, and community support.

CHAPTER IV

ANALYSIS OF THE DATA

Findings

The purpose of this study is to investigate the leadership technology standards and technology competencies of the elementary principal. Further, the purpose of this study is to examine how and by what means the principal integrates technology into the educational environment.

The medium of data collection was through a self-designed open-ended interview.

Principal 1

Q1. How do you foster a shared technology vision in your school?

Actually it ties in rather closely because we're a small district, we're just a K-6 district. Administratively we get together at least two times a month. I'm the only other principal in the district so I work closely with the superintendent on all the goals, so what she has designed as the superintendent has been... I mean with me, with the board, with the technology task force that's been in place for six years, our goals are really synonymous.

I guess primarily we certainly share with them our goals, our five year plan which is in place for technology. Both the superintendent and I are involved in extensive staff development opportunities, for example, on January 17, we have a number of things in place that involves technology, and we also have been fortunate to have two technology coordinators, one in each building, so that those people are really

responsible for seeing different things through, for helping us with the design of our web site, web page, and making recommendations for keeping us all current.

Q2. What do you do to advocate "best practices" in technology?

With our problem based learning, we use technology extensively with that... to help us with our rubrics so that developed technology is certainly a piece of that pie. We've had school goals which focus on the implementation, and integration of technology that was two years ago. One of the things that I do when looking at lesson plans is to... because we have five computers in each classroom as well as a lab, to see how staff are making use of technology within their classrooms, also, in overseeing the (technology) coordinator who's here and what he's doing in terms of planning with staff, and the projects he has in place.

Quite frankly, that's something we need to improve upon. I'm fortunate to sit on a state-wide committee. I'm one of the panelists, coordinators, for New Jersey best practices. On the whole it doesn't just carry through for technology, but we had done something like this for language arts a couple years ago where we had a half a day devoted to the sharing of best practices among the sending districts, Essex Fells, Roseland, and Fairfeild. We all feed into West Essex Regional, so we had representatives from the various grade levels to share, and actually you've given me a idea and that when we get together on the King holiday when we all have the day off for staff development, that we set up something like that, because that really is the best way, one of the best ways... I think that staff development day we had for language arts sharing of best practices was the best in-service piece that we've had and I've been here for twenty-five years. It was received

extremely well by the people who participated in that particular component. We plan to do it (best practices) for math, but certainly technology would be a great one.

Q3. What do you do to promote technology integration in curricular design and instruction?

That's an area where we used to have a separate curriculum, and that was done in Ninety-Four, and (since) then our focus has been to include the technological pieces within the various curricula that we designed. For example, In social studies which I was just the chair, I was able to work with the committee to have them really delineate rather carefully those web sites, those activities which would be technologically based. I provided them... there's just a whole host of web sites that I was able to put together for them...so that when our curriculum was set up...this was just approved... you know that they have different web sites, that are available, that are recommended for people as they hit in addition to that, you know in terms of the activities that we have listed. You'll see as you go through different pieces of technology and how they're integrated with them. We did this in terms of the standards, and I think that has really helped us quite a bit, so that we really look upon these things as a more working document. For example here, this is in the third grade and it was under standard six point eight and we make us of this CD ROM Pilgrim Quest, and laser disk U.S. geography From Sea to Shining Sea, and just different things. On the back we make reference to the Holocaust books dot org. Let me just give you an idea of how that's designed. This is our most recent curricular revision. This is our plan.

Rather than have a separate curriculum guide, which used to focus maybe on keyboarding or on word processing, and utilization of different software, I mean we've just found that we wanted to go this particular way....In all honesty though this has just been approved by the respective boards...and this is joint curriculum writing and we're going to move into mapping...curricular mapping, which most of our curricular revision takes place it's going to be done along those lines. This was the last of the joint efforts, and by that I mean I had representatives on the committee from the four sending districts, and this is what we decided to come up with. One of our tasks, and I think this is a challenge for all administrators, is that we really need to evaluate its (technology) effectiveness, and we don't do that, enough of that, and its like anything else I don't want to say we don't have enough time...we have to find the time to really evaluate, to see how effective the new curriculum is in the respective areas. So we hope to really get input from staff along those lines.

Q4. Describe the degree of assistance that you provide for teachers to utilize technology to access, analyze, and interpret student data.

We certainly get the print outs, we have the CD ROMS, we use the TERA-NOVA to share those with staff. One of the things we haven't done, but it just came out from the state, I don't know if your familiar with them, but they have assessment...standards and assessment...and I just had given them out to our staff...we have to have a meeting devoted to that, to share that particular data, but each of them has a CD to work from and its got...and we have just gotten that. So certainly we're going to look to utilize those kinds of things.

Q5. How often do you provide, design, or support technology-based professional development opportunities for your staff?

Our board has always been most generous with what we're trying to do. They believe in the use of technology, the integration of technology...the task force that was set up...it's an interesting piece, it's made up of administrators, board members, community members, and we're fortunate that we have a number of parents and individuals who own their own companies, software companies, you know, have arranged to set up wiring...we had the wired schools...you know as best we could, I mean this was done on couple Saturdays and to advise us as to T1 wires versus, I don't know some of the terms of this stuff. I'm talking about some real quality advise, people that have a lot more background in this area than we do, and all of them have really come together for us, as I said that task force has been literally a driving force behind what we've done. I certainly want to say our superintendent has spearheaded this particular move. I think we're...we may not be where some other districts are but I think within our group of districts we've really moved ahead. The plan is to continue to upgrade...people are always going out getting set up where they go to the New Jersey Texpo and that's been going on for about the past four years, and they come away with some great ideas from that. Our school was sited as...in Ninety- Nine, two years ago we had a...we were at the Northeast Educational Computing Conference...that was in June in Atlantic City, last year it might have been in Atlanta. It was really sharp and we were one of the presenting schools where we took...we were able to chart volcanic and seismographic activities around the world, and then chart it on a

map, and we presented it, and it was a matter of the kids using the technology on a daily basis. Our activity was chosen and we brought students down and our then technology coordinator who presented and I got a chance to go down and it was a great day.

Q6. What type of technology-based student record keeping system do you and/or teachers use?

Actually we're not there yet

Q7. What type of technology do you use to communicate with peers, experts, and educational stakeholders?

No, in some respects...right now I'm going through New Jersey ELITE. In terms of visiting various web sites and e-mailing and things like that I'm fine. I never was much of a you know in terms of doing a word processor or just doing some creative stuff...I'm learning how to get to that point. I need to just devote the time to doing that.

Q8. How often do you provide opportunities for staff to share technological innovations with one another as staff development?

We need to do more. Our meetings have moved away from the housekeeping items kind of thing to more of a share, and we have grade level meetings each month, we set them up...we have general meetings, we have grade level meetings, and we have developmental team meetings, and that's an area we need to focus and improve.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

No Response

Q10. Are the staff's technological proficiencies, as measured against current technology standards, important to the assessment of instructional staff?

Of course, we have our people who certainly... some are less proficient than others. We do our best to move people forward, to create opportunities for them. We have had a number of mini-courses, if you will, after school, where staff get in-service credit for attending different things. But, it's like any other organization you have some people take the ball more so than others.

Q11. What type of word processing do you use? How do you use it?

As I said, I mainly have my secretaries take care of that. I never took typing and I'm... certain pieces I'll do. In all honesty I've held myself back, not that I should have, but these are things that I know I need to go.

Q12. What type of database applications do you use? How do you use it?

None

Q13. What type of spreadsheet applications do you use? How do you use it?

I've played around with Excel. But again, not to any great degree.

Q14. What type of e-mail do you use? How do you use it?

Every day. We are set up so that every class... you know we have the Internet capabilities, and we certainly rely upon that. We have our parents who will e-mail me with certain things.

Q15. What type of presentation applications do you use? How do you use it?

I did mention I'm learning about power point. I have the kids help me with that too. There just great at that.

Q16. What type of desktop publishing do you use? How do you use it?

No

Q17. What type of world wide web navigation and search engines do you use? How do you use it?

You know every day. I mean hose are my areas of strength.

Q18. What type of statistical applications do you use? How do you use it?

No Response

Q19. What type of class scheduling applications do you use? How do you use it? You see I didn't design that personally, but with the technology coordinator, I mean he had done that, you know class scheduling. That was the first time that was done by the way, we did that this year. I've always been responsible for scheduling, pretty much for both of the buildings, and I have an affinity for doing that, but we made some changes the way we structured our classes here. For example, we went to a five period morning and a two period afternoon. We're evaluating that, the effectiveness of it, its got its plusses and minuses. But I mean just setting up the givens, to have it come out that reading is going to be the first two periods for fourth grade, and then fifth grade has the next two and then there's a prep and then the last two is sixth grade or you know, all that was set up this summer for the first time using software. I don't now what he used, again I certainly had input but I mean the actual piece was done by our technology coordinator.

Q20. How many students are using technology for basic skills acquisition?

Yes. Although we don't have a basic skills program per se here because we don't qualify... let me qualify that answer by saying, our kids score above the MLPs, and we set our own benchmarks for kids that we want to service so we do that in-house we don't really qualify state funding at all. We have a program called Academic Tutorial Program, and for different activities or software that the teachers may feel appropriate, you know those kids utilize that. What number that is I don't know.

Q21. How many students are using technology to achieve higher-order thinking skills?

That I'm going to say is a god number because certainly that's been one of our thrusts to promote those higher-order thinking skills, and I'd like to think that's going on throughout the day, so we have 262 kids and would hope to some degree that's being done. And again, with our PBLs we're pretty much on-board with every classroom now, it started out as a pilot last year and now its pretty much moved to the school. So, I think I can answer that pretty much it should be the entire student body.

Q22. How many teachers design and implement technology based learning experiences that promote higher-level learning, and authentic assessment? How is this done?

I think maybe in terms of a percentage, some do some don't, I want to say maybe half, maybe forty percent. I think that's a pretty close... I'm just thinking of our people... I would say that.

Q23. What technology resources are available that supports specific topics or lessons? How many teachers utilize these resources?

No Response

Q24. What is the availability and accessibility of technology that supports varieties of teacher and student experiences?

In our media center we certainly have computers set up. We share Destination 2000, that's the T.V. monitor and projector that goes along with that. But we have a lab of twenty three PCs, and the kids go there... they're scheduled for two periods a week, and at least we alternate that, so it's... and then they go there on a as need or sign –up basis you know to do some joint projects, so in addition to what's going on in the classroom we have the lab.

Q25. How are technology resources being allocated, e.g. staff development?

I think, again I mentioned before about the social studies piece, and about some recommendations for utilization of software, and since we've just begun that, in fact I've been charged by the superintendent to really investigate resources that will augment the social studies, and I'm only speaking to that because that's what we've just done, and in and among that I'm certainly looking for software that we can utilize with that particular piece, and I think that would hold true for the other curricular areas, so I think what we're trying t do is move away from a lot of the word processing that's being done. It's a good thing to write, but to really use search engines and have kids doing research, visiting the various web sites... we have both buildings networked, and that's brand new for us and that's been a help.

Q26. What building level organizational structure exists that supports all aspects of technology?

Well yeah, I guess at the faculty meeting we do have our coordinator then share his thoughts and certainly to solicit any troubleshooting that needs to be done. Also, to meet with the other technology coordinator to recommend for staff development opportunities or to create them in house. We also have this thing that was neat, in fact we're gonna put in for best practices on it we call it network buddies. It's an inter-generational group...we have our seniors who came into the school and there were four sessions that we had set up, and the kids welcomed them and then they were in the lab, and they did some keyboarding they did...they were able to surf the net. I guess they examined some various pieces of software. Just some real practical stuff for people who wanted to come and learn; we get a great response from that, and we get about eighteen seniors who came in. You now, there were four programs and we're gonna do that again. Actually hey got certificates and we got sited by the Camber of Commerce when I had written it up as their acknowledgment of a best practice for us, and we're in the process of writing that up.

Q27. What is the extent of community involvement regarding technology in your school?

Again, as I've said, it's been very highly supported by everyone, and I mean that in all sincerity, and as I said, even at the senior piece, it was and is great to have them here, but it's also great public relations piece, and that we're welcoming

them and also letting them see first hand where their tax dollars are going in terms of not only technology but every thing else that goes on around here. And I think we need to do that as educators, to help these people actually see how neat some of this stuff is that's going on. One point is, well we had X number of kids that went to school here years ago, and what's great for them then should be as good for them now and that doesn't hold true with all the changes we've undergone, but for them to see that and experience that first hand, that's been a big asset to us.

Q28. How is technology used to align standards, curriculum, and assessment?

Well again, I know I touched on it briefly, but that has started to become more of a focus certainly with the social studies piece that I had mentioned. We intend to really incorporate it, you know a lot further as we continue to revise our curriculum. I did mention, I guess a half an hour or so ago about how we used to have a separate curriculum for technology and we felt that was not the way to go. It shouldn't be isolated, that it should be integrated, and that with any of the curricula that are written. They will be designed siting specific activities or resources where technology is used , and setting them up according to the core curriculum standards.

Q29. What percentage of students have continuous access to technology in school?

Again, we're a J factor district. It's an affluent community, and maybe five percent of the kids don't have computers at home, and that might be over-estimating the number that don't. I know it's not many. As I said they really have

access by virtue of the lab and also the computers in the classroom, you know each period, and it's just a matter of the teachers being able to say, hey guys this is what I want, you can certainly us it, we have to share that. One of the things we do, also is we'll have a cut across grading where we'll have some of our fourth graders who maybe if their working on some project with computers in the classroom and they're filled up, they will go into the classroom with fifth graders and sixth graders, so we have that in place, so that we're really trying to maximize the use of our computers, and it's a neat thing, and they know enough to go in and sit themselves down and to go about their business. That's been a neat thing. I give staff a lot of credit for that, because they could be teaching math or whatever and they'll have a couple guests who may come in. So that they are being utilized. It's not like they're just turned on and they're just there for show with a fancy screen saver on or something like that.

Principal 2

Q1. How do foster a shared technology vision?

We have a technology committee, that we formed, to come up with a technology plan, and what we were going. What happened is, we had a new superintendent come in and we needed to go with technology, and asked people that were interested at every grade level and some specialists, would you be on this committee? We had the committee and the committee meetings were deadly. They were at night, they were with community members, and we got a lot of insight from different people on different levels from what they were looking at...which gave us...so when they came in more people were ready to buy into it

because we were all on this committee. It was a lot of work, I'd say the committee went for a good year before really...I thought we'd never get the plan done, I thought we'd never get any further, but it's real work throwing everybody into it. There were members of the community, board members, members that were asked from the community if they would like to be part of it. We tried to find community members who maybe that was part of their job...working with technology.

Q2. What do you do to advocate "best practices" in technology?

Well what we did here was, we hired a new computer teacher/consultant. She teaches the computer, but she also oversees the other technology in the district. We went with the new person because, the person that was in place did a nice job for that, but we had a big vision, and she didn't feel comfortable with our big vision. So we interviewed a lot of people, and what we did was we went with someone who we thought was a people person that could draw other people in, because at that point we didn't have much technology, and what we had other staff members were afraid of. In fact I heard one staff member say I don't want any computers in my classroom, and now she's one of the ones who love it and uses it a lot. But I think it was because we had this person who was going to be on top of it, a people person, who could go out and get the information. In fact I did a lot of the technology stuff before this person came in, and my expertise level isn't that good, but at that point I was better than anyone else here...and that's how we stay on top of it, and be able to institute this practice. She's part of a consortium from Warren County, and through the ETCC at the Warren County Vocational School she meets with all the consultants from Warren County, and

they meet once a month, and they talk about...in fact she's in charge of the Warren County project this year, and the last couple years the Warren County projects have been sited by the Department of Education as being very unique and different.

Q3. What do you do to promote technology integration in curricular design and instruction?

We started, I guess, very basic. We had the teachers...the teachers had to go with their classes to the technology lab. We have a lab and the teachers each have two computers in their classrooms with a printer. The computer teacher would start with teaching whatever skills each grade level was at, and then the teacher at the grade level had to decide was she was going to do with the skills. Were they going to do a hyper-studio. Specific grade level teachers were using hyper-studios with presidents reports. So, the teachers and the technology person worked together to integrate the curriculum that way...so that we really don't have a separate...we kind of did away with our separate technology curriculum for a while until we could get going, and now its teaching these different skills but then applying them to the curriculum at each grade level where the teacher would like to do it.

Q4. Describe the degree of assistance that you provide fr teachers to utilize technology to access, analyze, and interpret student data.

We use report cards on line. We work with the teachers to do grading on line. I'm not really sure what your looking for there...I don't think we're really doing anything at that level...not that I'm involved with...I'd have to ask my...I now we

used some things for spread sheets, but we haven't used it for student assessment kind-of. The other stuff, the simpler stuff, the report cards, but not an over-all.

Q5 How often do you provide, design, or support technology based professional development opportunities for your staff?

We do a lot of professional development. We were part of a grant from ETTC for Warren County College and Vo-Tech School, and we are able to send our teachers over there, and our teachers can take part in whatever professional development they're offering. It used to be for free, now it's like a minimal cost of ten dollars, and with this grant they even pay for the substitute for us. Whatever teacher wants to go, we let them go. We also provide professional right in here with our consultant, our teacher consultant, and we have provided on-going... technology is fairly new, but, and, we just really got up to speed in the last couple of years and pretty proud of what we're doing now, but we do a lot of professional development, because my feeling is the only way we're going to get it to work is if we can get the teachers to buy in, and be able to do what they... we have a core group of teachers that go all the time, and I find that the teachers are more comfortable here, going down to their own lab. We had a college come out and did a couple of days of training in our lab with our teachers. ETTC is up the road ten minutes, so I think people feel more comfortable. And like I said, going back to hiring the person to run the whole program is a people person who can pull people in and make people feel comfortable. Technology for some of my teachers... they were really afraid, but now they're all going.

Q6. What type of technology-based student based record keeping system do you and/or teachers use?

We have variety of... like in the office we have like for the attendance records, and these are all relatively new. We just started a new program with the attendance, because we have to keep up with... you know, children are either in or out. The cafeteria's just got one, I'm not sure what the name of that one is... something where they can order and do things... and then the school nurse is putting all her records on. It's taking us a little while, because when I first got here ten years ago there was nothing, so, and, now we're getting a lot of software systems to do that. Myself, I'm not directly using them, but I can go and access... today there was a question with a report card committee about the report cards. Our report cards are all done on the computer, and so all the teachers have them in their files. So, I asked the coordinator if there was any-way for me to see all the report cards. So, she downloaded all the files and e-mailed it to me so I could be able to get that and have access. Those kind of things we're doing more and more.

We're part of the server through Warren County... all our teachers have e-mail all our students have e-mail, and we have, I think they call it the H-drive, some drive, where you can get... I can access... I talked to the coordinator cause I didn't want to access teachers files that were private, that were private files, but because the report cards are in their own file here and she felt it was O.K. for her to download and give them to me. So we're trying to do more of those kinds of things.

Q7. What type of technology do you use to communicate with peers, experts, and educational stakeholders?

I use a lot of e-mail. I use it a lot. I've really gotten, as far as writing things pretty lazy on that. I do all my lesson plans, reviews, are all e-mailed to the teachers, which was interesting when it first happened some of the teachers were real nervous because they didn't... they weren't using e-mail and they had been trained... it forces them to... when I send notices about faculty meetings it's e-mail, so they have to look at their e-mail. We have a daily bulletin that comes out every day that's e-mailed to all the teachers, and we only have a couple of copies on paper for people that don't have access to a computer, and that would be like your aids, everyone else... we do it as much as possible.

Q8. How often do you provide opportunities for staff to share technological innovations with one another as staff development?

What we do here is at faculty meetings allow teachers to present... I try to use my faculty meetings as professional development, and we do a lot of turn-key, so if someone has done something that's really working well, they present it at a faculty meeting to the other staff members. That is usually coordinated through with Val our technology coordinator and then she'll say oh this teacher is doing a really great project lets share it with the others, and so we'll set it up and share it at a faculty meeting. So there's a lot of that, give and take.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

I haven't done a lot with technology on that and that can be because of my lack of comfortability with I feel like I can do things quicker like when I go through like the ESPA scoring and look at those. I've been doing those all by hand, right now I'm at the point where I can do them quicker by hand, at some point I want to be able to do that and use technology. If I need to do that I get someone who's better at technology like Mike who's better at technology than me, or Val and than we'll do it that way. But I remember someone saying if it isin't faster you should continue to do it the way you do it until you get to that point.

Q10. Are the staff's technological proficiencies, as measured against current technology standards, important to the assessment of instructional staff?

That is something I look for in the classroom when I go do an observation. What is being used? Is the computer being used as a tool? How are the teachers using it? I have a pretty good feel for what teachers are using for what and a lot of them have come so far and they are working with each other, and I see it being used as a tool, not as a replacement for them, but as a tool, and I don't see...when we first started this the computers in the back of the room were used as rewards a lot...you got your work done you can go to the computer and play a game, I don't see that much anymore. I see children that if they finish this work they can go finish their project on the hyper-studio or their whatever project on the computer during...and they're actually integrated with whatever subjects, so, they're really using them like another tool like pencil and paper or whatever.

Q11. What type of word processing do you use? How do you use it?

I use mostly Microsoft Word. I use it for again, I use it for my evaluations, if I have time, but sometimes what also do is...if I don't have time, if it's handwritten, I give it to my secretaries to type up. But, mostly evaluations...reports...I was the secretary of the technology committee when it was running, so I did all the taking notes and things like that.

Q12. What type of database applications do you use? How do you use it?

I use the Excel for spreadsheets. I'm not great at them, but I'm working on them, and it's getting there. And there was another one Access was it? I can't remember the name of it.

Q13. What type of spreadsheet applications do you use? How do you use it?

That would be more of the Excel that I use. There was something else that I used...and that I usually keep discipline, so that I keep track of how many times a child has been in. So, kind of like a file rather than a paper file...I'm trying to keep a file on each chld on what they're doing. Like if they come in more than...a repeat offender. I'm trying to use more technology. I'm forcing myself to use it more and more. First I just started with the lesson plans, and then the teacher evaluations, and I had software to do the teacher evaluations...it comes with a CD and kind of helps you.

Q14. What type of e-mail do you use? How do you use it?

I use it a lot.

Q15. What type of presentation applications do you use? How do you use it?

I've had to present at faculty meetings and board meetings, and I've used the Power- Point. I really enjoy using the PowerPoint, it's kind of a fun one.

Q16. What type of desktop publishing do you use? How do you use it?

I don't use desktop publishing.

Q17. What type of world wide web navigation and search engines do you use? How do you use it?

We have Netscape Communicator.

Q18. What type of statistical applications do you use? How do you use it?

Maybe at some other point. I really don't think I have the expertise to do that right now. It hasn't been like a priority, there are other things that are...you know.

Q19. What type of class scheduling applications do you use?

We don't have any. We've asked around several schools and we haven't found anything that we're happy with. We're doing it by hand, but we're a small disrict, so we're able to do that, but that's something I would love to see if we found one that would work in the elementary school and the kind of way we're doing things.

Q20. How many students are using technology for basic-skills acquisition?

We have a lot of software to do that, it's real interesting, probably most of it's special ed population. The special ed population is high, maybe sixteen seventeen percent, cause we keep a lot kids in, and so we use our AD money to actually buy the computers and software so we have them in the classroom.

Q21. How many students are using technology to achieve higher-order thinking-skills?

Our new math program came with software, CD's, whatever, and started with the coordinator would do that in her class and eventually got so that the teachers

could do it in their class, and they would do a lot of the higher-level learning skills that do apply the math for problem solving. It came with the curriculum and the math curriculum, is how we're using it. The board approves it and we try to get the same type of curriculum, or textbooks for everyone so there's continuity.

Q22. How many teachers design and implement technology-based leaning experiences that promote higher-level learning, and authentic assessment? How is this done?

I would say I have about twenty percent of the people are really good at it, that are really into it, and those are our core people that we use to tie in the rest of the people. We're trying to get them to at a point where they're at a level where they're doing some of the same thing their colleagues are doing, and pull them in.

Q23. What technology resources are available that supports specific topics or lessons? How many teachers utilize these resources?

What we've done is, we have this technology coordinator, she orders all of our software, she has it all organized and has it out in the classroom. So she knows what's available, the staff knows what's available so whoever is using dinosaurs or whatever can have access to it and were not being redundant and buying more than we need to do. I think that's really been helpful. Sometimes the teachers... if they don't have it on the tip of their fingers they can go to the coordinator and say I need something for blah blah blah and she can pull it and get it for them. And all the students have access to the Internet, using the Internet a lot here. We haven't had too many problems with issues. That was the tough part to get

through our plan (ethics issues). Some people didn't want us to use the Internet at all. To me its like how can you not? We've got to find ways to make it safe for them and use the Internet and even things like having a homework line, they didn't want that because they said it was a crutch or something. I don't see it as a crutch, I see it as technology that's something that's out there, If we can use it lets use it. So there's a really hot, hot debate about the whole Internet, luckily the people on the committee that were for the educators kind of cut through.

Q24. What is the availability and accessibility of technology that supports varieties of teacher and student experiences?

Actually I think it's very high here. I think...every teacher has one hour of lab time, but there's open lab during the rest of the time, so they can sign in and go in whenever there's open time. So our lab, you have to sign up early to get in, and our consultant tries to make sure that everyone gets different chances to come and go and use it. So teachers are not just using it for that one hour, they're using it a lot. They go down there for math class, they bring their math class down and do their lesson. We weren't using the lab too much for Kindergarten, but we started using it for Kindergarten more, but everyone else...but its taken s a while it's taken us three or four years to get to the point where the teachers feel comfortable doing that. And again you have your core teachers that have been doing that and now the other ones are starting to come along and do the same thing.

Q25. How are technology resources being allocated, e.g. staff development?

I think we spend a lot of money on...we had made technology a priority here in our district. The way we set it up was...Why haul all these computers in, cause

we'd been to all these other schools that wired all these computers and no one was using them. So the emphasis was on staff development, to make sure the staff is involved, they have to go to class, they have to go to our class once a week with their students, so that they're learning along with their students. What we've done with the teachers that a beyond that, that don't need that (training), we give them other things to do, like other activities that they can do on the computer. So that their skills can continue without having to listen to another hyper-studio demonstration.

Q26. What building level organizational structure exists that supports all aspects of technology?

We have a coordinator here and she has a person that helps her at the other school that kind of teaches over at the other...the first, second, and third grade, and we have a techie person who puts stuff on the computer and he's full time here at the district level. He is actually one of our custodians, who got into computers, excelled, and now he really knows computers. We're not paying him a lot of money, he could probably go somewhere else and make more. He's great what he does, when the teachers discover activities or tapings...he's just wonderful, we use a lot of the digital cameras, and he helped the teachers when we were doing a story where they did the clay...they moved the clay...the pictures...and it looked like the clay was moving...different types of activities and he really gets into those and helps the teachers with those so he's not just fixing broken stuff and putting stuff on, but he'll actually come in and help you with stuff.

Q27. What is the extent of community involvement regarding technology in your school?

We started with the committee and there was a lot of community involvement with that which was great. We had hoped to open our lab to the community, where the community members, we were thinking about the senior citizens come in and use the lab, we haven't done that, that's something we look to...we have a computer club after school where the kids can stay and work on computers. Our district is pretty...we don't have a lot of diversity here, it's fairly affluent. Most people have computers, there a very few people that don't have computers at home. But the kids still want to come to computer club and be part of that, but one of the things we'd like to do is open it to like senior citizens to come in...we have this thing...a publishing company comes here, they invite senior citizens, they work with the sixth grade students and they write a book together. The sixth graders interview the senior citizens and they do that in December, then they present them with the book in hyper-studio presentation in May. And a lot of seniors at that meeting had said they would love to learn how to do technology. So some of them have actually brought the seniors down to the lab and showed them how they did the books, and that's what we'd like to do more of, to get that kind of involvement. People that work for some of the techie companies like Bionet, Lucent, or ATT, we've had those people on our committees, and helping us out with different things.

Q28. How is technology used to align standards, curriculum, and assessment?

We use a program, I can't think of the name of the program. We used a program that aligned all of our curriculum that we...it was software that we bought with maybe another district, cause it was very expensive, and then we met as principals and aligned our curriculum to the core curriculum. It was good for us to get started, and it was helpful because it had all the standards and it even had the national standards not just New Jersey Core Standards. But it was only helpful to a certain point and then you had to kind of go on your own, but it kind of gave us a template and an outline. It was really good.

Q29. What percent of students have continuous access to technology in school? All the students have email. All the students have files, the teachers have files on their computers in the classroom. Even our special ed students...we have a number of computers that have been adapted, adapted for the disabled students, so even the students that are at a level they're still using a type of technology. Students can request the lab with the permission of the classroom teacher. What happens is some students are not as quick as other students or some students go home and work on their computer at home, other have that luxury to do that at home. So what the technology coordinator does is she has time where she knows what the kids are doing, she'll say O.K. from this time to this time your welcome to come in. It's limited, because you have to make sure there's an adult in there. But there is...students can come in and say I need time and ask for a pass from the coordinator and she'll give them a pass. I'm really proud of what we've done here, we've really come a long...cause when I first got here they were doing that turtle stuff. The person that was teaching was a very nice person but she was

comfortable with that... that was all she wanted to do, and we wanted the whole picture, we wanted the servers, we got the digital camera, we have the screens that come down in the cafeteria now and we can show the videos. We wanted someone who could see the big picture and train everyone and get everyone comfortable, and I think we've really done that. When I went through the interviewing process to interview, there were people that I interviewed that had wonderful technology skills that were far above the person we hired, but the people skills were awful, and my feeling was I don't care how good those skills were if you don't have the people skills and you can't get my staff involved we're not going any place.

Principal 3

Q1. How do you foster a shared technology vision?

All the teachers here are on e-mail, so we can e-mail all the teachers. The district we're part of... family network communication... the whole district is involved. Every school has a website, and I have a website master assigned to my school, so all my staff... and we put everything on it, principals, messages, PTA messages, school announcements go in there, monthly calendars. We have classroom... a thing called classroom connections, where the teachers up-date it almost like every two months. They'll up-date what's happening in their classroom; new projects going on, or they're involved in some new project or activity or something or what they're doing in the various academics. Any parent can log on any time they want and pull up the particular child's teacher and see what's going on. They could pull up to me, PTA news. The district also has part of this

website, they could pull up district or they'll put lunch menus on there. They'll have construction up-dates that are going on through the district through the superintendents office, so that's how we keep in touch with the community. The teachers all have e-mail, so a lot of times parent will e-mail teachers or teachers will e-mail parents back if they have e-mail regarding the student's progress, homework or whatever they want to do. We have two technicians that work for the district that hook up everything and maintain everything if something goes down if it doesn't work, they do it. The person who does our web, who does our website, for the ____ ____ school is a teacher here, and she receives a stipend, she receives a stipend for that, and we give her all the information and she's the one who loads it up on the computer and keeps it up to date. It's a posted position so anyone can apply for it, very few people do cause you really have to be computer literate. She is very computer literate, in fact she is one of the teachers that for the supervisor she will teach a lot of these courses after school for the teachers, for a stipend. But it's great because she has a couple kids in college so she can use the extra money.

Q2. What do you do to advocate "best practices" in technology?

In best practices here? What we do is...in all the elementary schools or should I just speak to ____ ____ school? We had a technology department over here in the library where we have twenty-five computers that are hooked up to Internet, e-mail, and what we do is all the teachers are assigned, every grade Kindergarten up until fifth grade are assigned computer time. Fourth and fifth get an hour, K to three they get a half hour a week. O.K. so what we do...and it's their

curriculum, there's a curriculum for them to follow for our computers for all the children. In addition to that, in grade three, four, and five each classroom has approximately three some have maybe four computers for student to do individual assignments for teachers, Internet work, whatever. This district has really done a lot for technology. Our supervisor of technology throughout the year sponsors many, many workshops for the teachers, after-school, free of charge, at various locations, to learn all different programs that have come out. How to work with digital cameras, how to do all new programs, Microsoft Works you name it. I mean there are programs for teachers and they get credit for this. So I encourage all our teachers to participate in these programs so cause there free of charge.

Q3. What do you do to promote technology integration in curricular design and instruction.

I encourage t a lot. My teachers, when we have staff meetings, when I observe my teachers, I try to have them demonstrate to me that they are doing... incorporating technology into all the areas, as much as they can. You'll find a lot of it with science, not a whole lot of it with math, and some with language arts, but I find a lot of it done with social studies, I find a lot of it done with science and we try to promote that. Like I said, it's easier for grade three, four, five, cause you have the computers in the classroom. It's a little tough for K, one, two, three. Some will have a computer some won't so it's kind of tough with twenty-five kids in a class with one computer, but they do use it through the lab, all right because we have a form that the parents sign released so the children are allowed to go on the Internet. They're all assigned a pass-word, so no one can get into their e-mail

or their files that they keep on there. So that's how I promote, I encourage teachers to use the latest technology.

Q4. Describe the degree of assistance you that you provide for teachers to utilize technology to access, analyze, and interpret student data.

Not really. The teachers will find a lot of this stuff on their own, and they'll turn key it at any staff meeting monthly where we open discussion at the end, and teachers will come up and say hey I found this great website, for something about this year for teachers or something regarding science or something. If anybody's interested see me and they'll turnkey over the website, you know the log in, the address or whatever it is and they'll do that, or if they go to a conference and hear something they'll turnkey the information, but if I come across something I will do it too, I'll post it or I'll put it in my weekly memo to the staff, hey check out this website or something... but it's not a routine thing it's sort of like sporadic.

Q5. How often do you provide, design, or support technology-based professional development opportunities for your staff?

If I have the money, if they want to go, they go, it's as simple as that. We get a budget for professional days, which is kind of nice too, the supervisor me gets a lot of extra money from Eisenhower Grants, so I try to encourage the staff to go, if the want to go to a workshop I'll put in for it, and if I have the money I'll do it, I mean I don't have enough money to send everyone, so I try to rotate around saying look if you went last year to a technology conference then don't go this year, let someone else go and try to do it like that. But if Ron, that's are

supervisor of technology, if he has money, and if they apply to him, and he says they can go, let 'em go, I have no problem at all with that.

Q6. What type of technology-based student record keeping system do you and/or teachers use?

The teachers really probably don't use any technology...the whole district though, we keep everything on records, everything's on computer, and that's all done through my secretary. That's all attendance, all parent information, emergency information, residency, anything that's related to them...it's all on computer...our monthly reports everything are generated to the superintendent, our lunch program is all generated...everything, the violence vandalism reports are all generated on computer to Mr. _____ office and then what he has to do on his end to the down to Trenton Department of Education everything is on computer, everything. The secretaries are called quite frequently in all the schools to various locations for up-dates. For up-dating our databases and things like that, but everything is on the computers.

Is it networked to ____ office? Yep, everything is networked to him.

Q7.. What type of technology do you use to communicate with peers, experts, educational stakeholders?

Mostly e-mail. Yeah, e-mail is all I use.

Q8. How often do you provide opportunities for staff to share technological innovations with one another as staff development?

Mostly at faculty meetings, I mean, you know, we have in-service days throughout the year and sometimes the teachers get a choice to pick a couple of things they

can attend. Almost all the time it will be something related to technology, be it learning a new software or new teachers in the district that are just coming here, you know maybe they don't know how to do e-mail, maybe they've never done e-mail, although in this day and age I can't imagine why, but there are still some people that don't want to stay within the computer, so the opportunities are available to them. Most of the time it's at faculty meetings as turnkey or in-service, I provide them with information or they'll just pass it along like that for open discussion.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

All my reports, all my reports to the superintendent, to the assistant superintendent, my monthly reports which has like I said student data. Test scores when they come in I have to compare. My ESPA scores from several years ago to this one here, look at my general population, my special ed population, my bi-lingual population see how their test scores are doing from year, to year, to year. I analyze that, and one of our building objectives is improving ESPA scores so I have to prepare that in my end of year report that we have to turn in to the, as part of the quality insurance report, to the state, and we have to present them to the board of education meeting. So, everything I do is with computers, everything.

Q10. Are the staff's technological proficiencies, as measured against current technological standards, important to the assessment of instructional staff?

I think the staff in this district, one again I'll speak for _____ school, I think my staff is very literate with computers. I don't think I have a staff member here that doesn't go on e-mail, that doesn't have Internet access, that is not pulling things off the Internet, using it. I mean the complaint I get is they wished they had more computers in their classrooms because it's a budget item. I think we're very computer literate, and I'm probably speaking for the whole district, I mean this district has really, what should I say, has really dove into this over the past ten years. We have really gone, and there's constantly computers being purchased up-dated I mean, when I first started we had the old Apples and the Apples II. They're all in the garbage, that stuff's all gone.

Q11. What type of word processing do you use and how do you use it?

I use Microsoft Word. I use it for monthly report, reports to the superintendent, observations, evaluations of staff members, reports to department of pupil services, any type of reporting I have to do. Monthly newsletters to PTA, memos out to parents, if I do something or if my secretary does it whatever, that's all done by the software.

Q12. What type of database applications do you use? How do you use it?

You know what? I don't really use a whole lot of database. Most any database things I use my secretary does for me. Personally, I don't do too much of that.

Q13. What type of spreadsheet applications do you use? How do you use it?

No. Same thing. She does it all, that's for the attendance, our attendance for staff and students. All that spreadsheet stuff is done by my secretary.

Q14. What type of e-mail do you use? How do you use it?

No Response

Q15. What type of presentation applications do you use? How do you use it?

I don't do a whole lot. Once in a while for my staff like if I want to show them something like at a staff meeting, a monthly staff meeting, I'll do that, or perhaps on an in-service day, but I don't do a whole lot of that. _____ does a lot of that cause he's always making presentations to the board.

Q16. What type of desktop publication do you use? How do you use it?

Once again, I don't do much of that. Any of that stuff goes in my secretary does that for me. I don't even know what she's using.

Q17. What type of world wide web navigation and search engines do you use? How do you use it?

I couldn't answer that question for you. I mean I have my own websites that I go to, my own search engines, and things like that. If I come across something that's good I'll share it maybe a particular teacher who I know might be interested in that, but not a whole lot to a whole staff or something so...

Q18. What type of statistical applications do you use? How do you use it?

No Response

Q19. What type of class scheduling applications do you use?

Our computer, actually that's the final step it goes on the computer, but a first of all there's the planning, as that's done it's a cooperative effort. It's me, it's always with my case manager from special ed and the guidance counselor. In the school, and it's probably the same in your district to, our schedule really at the elementary school is built around the special ed kids. People can say what they

want, they really are built around special ed kids, and what we need to do, we'll start in March making schedule for special ed kids, all our special ed kids in the school and then the schedule for the rest of the staff are built around them, because for example, if kids are going to be pulled out for resource room, and let's say the second graders and four of them are being pulled out to go to a resource room teachers from let's say nine to ten, well then that teach can't have a special from nine to ten, cause those kids aren't there. I mean all the rest of the kids can't be in gym or library or computers and these kids are in language arts so you can't just blocked out. So a lot of that is done with the planning ahead of time, and there's other variables, I have teachers for example my music teacher is only here four days a week, the vocal music teacher. So there' no music schedule on Monday's for her. So I've got to fit in everybody in four days. Now my librarian is interesting, but all that's going to change when this construction is done. All our computers, we lost our computer room, like we lost all our special rooms with overcrowding that's why we have all this construction going on. We're going to have a huge school here when this is done. But we were the last ones to get it, so I don't have an art room, we have art on a cart, I don't have a music room, vocal music, there's music on a cart. We have library on a cart now because I had a class in the library until our two trailers in the back here were just available the week after, the Monday after Thanksgiving. So for two and a half months, that class was in the library which meant that library was on a cart and there was no computers. Cause the computers are in the library cause we lost our computer room about five years ago. So that really was a nightmare, so

what we need to do, you have to take all these things into consideration, but yet then when we're done it's all set up on computers. We pull it up and we give it to all the teachers, but its quite a lengthy process.

Q20. How many students are using technology for basic skills acquisition?

Probably every kid in the school. I would say, and we have approximately five hundred kids here.

Q21. How many students are using technology to achieve higher-order thinking skills?

I would say mostly from grades three though five on. Because they have the computers in the classroom, they have more time in the lab, so approximately three hundred children I guess in the school, probably three fifths of the school, sixty percent.

Q22. How many teachers design and implement technology-based learning experiences that promote higher-level learning and authentic assessment? How is this done?

All of them. Every teacher in this school does something on computers, be it lesson plans, special projects, creating things, designing different projects or activities and then they'll run them off and make things for the kids, but they're always on the computer. Like I said, this staff is quite literate when it comes to computers.

Q23. What technology resources are available that support specific topics or lessons? How many teachers utilize these resources?

A lot. Like I said we have a curriculum, a district wide curriculum, for K through twelve. We have two specialists that will help with anything. We have the supervisor who is constantly promoting, like I said, these new programs that come out or applications or something, anything that's new that's popping up there. I'll guaranty you as soon as it's out, in a couple of weeks, you'll get a flyer that Ron is teaching a course on this or one of his people are teaching a course on this latest application or something.

Q24. What is the availability and accessibility of technology that supports v arieties of teacher and student experiences?

Everything really. In fact...maybe you want to...we also even have a computer club in this school. We have a computer club for the students after school. I have two teachers that co-advise this. It's for students in just in grade four and five. It's about three times a week they meet after-school once again there's a stipend and they do all kinds of applications. In fact the one was an art teacher had a half year sabbatical last year, the second half of last year, to study all computer generated art. She's really into the art and computer generated, so she's incorporated a lot of art into her curriculum on computers. She is like the computer guru in the school here. In fact she's the one I'll turn to if I have a computer question, if I can't figure out something I'll go to Chris. She's right there. In fact they had to limit it (the computer club) because they only have twenty-five computers. But what they'll do is, because they had so many kids, they started doing every other week like you'll go one week twenty-five kids and the next week twenty-five.

Q25. How are technology resources being allocated, e.g. staff development?

You know it's...I don't want to say there's a clear cut formula...if staff are interested they come to me...once again it goes back to the funds. If I have the money, if there's a workshop or something that's technology related they want to go to it...you know if they haven't gone to something else before if they've gone to a conference ahead of time I'll say you should know I really can't pay for you. If you want to go, you can go, if you want to pay for it yourself, I don't have a problem. You know we'll tell em' that I pay for one, I can't pay two for you and the next person doesn't get anything. I'll say if you want to go I don't have a problem. Put in a professional day form, but you pay for it. You'd be surprised how many teachers will pay for it, if they want it out of their won pocket, they'll pay for it. If they're interested they'll go.

Q26. What building level organizational structure exists that supports all aspects of technology?

Well as I said, we have two technicians in the district that service all the buildings, everyone, superintendents office, board of ed members, all of us. They keep our computers up, running, add things, you know if Ron purchases new things, new printers, scanners, digital cameras or whatever programs. They're the one that go around and install it all and maintain it. If there's a problem they call down from the library and say the printer isn't working, I just call Ron's office and in a matter of minutes one of the technicians is here and fixes it up, so which is kind of nice. They're not teachers, they're just technicians people that are hired, they're just regular techs.

Q27. What is the extent of community involvement regarding technology in your school?

We have these things called parent academies, like you said for the DEPA Grant, and we'll run throughout the year over the past couple of years they've had maybe four parent academies a year, perhaps they spread them out every couple of months, and they're different topics, and always one has been a technology, and to tell you the truth that is the one that is probably the most attended. When we've had other ones like we've had a parent academy where someone would come how to help your kids with homework and stuff like that. They're poorly attended. Once you do a technology one, like they just did a technology one up in high school, it was loaded in the lab. Cause there's a lot of parents that are into the computers and the technology and the e-mail and everything else, and they see their kids doing all this stuff and they want to do it. So that's offered to the parents and the community to. They come to these parent academies and they can be trained in something, it's all free of charge. And that's all done through DEPA money.

Q28. How is technology used to align standards, curriculum, and assessment?

We have K to twelve supervisors. They're in charge of curriculum of all the different disciplines. Under each area all the standards are set there, and just recently we distributed a disk to every teacher, I guess throughout the district I know it's in this school here, with all the standards on there from the state, I guess you probably got that disk too. All the teachers have a copy of it so they can load it up in their classroom, so they have all the standards and they know

how to align them too, but if you look at our curriculums, the curriculums align with every lesson every topic unit's being studied what standard aligns with them.

Q29. What percent of students have continuous access to technology in school?

The only thing we have is the after-school....the kids can go when the club isn't meeting they can go to the library any time they want after-school, the computers a available, but before school or after school. All you need is a pass from the teacher. We have an aid that's up there so if a student wants to come in before school or after school and work on a paper or something they have access to the computers. We don't get a whole lot of that cause as I said the upper grades where their really doing the papers, the teachers have computers in the classroom. So the kid could just stay after school, cause the teachers stay here, and they could go work on the computer in the classroom and pull off something off the Internet if they're looking for something for a science report or social studies...it's available to them...the classroom computers, and I tell you the truth most of the kids around here have computers at home. Most have them, my kids I remember when they were growing up they always had a computer at home, so to this day they know more than I'll...what they forgot I probably won't know. I mean all this stuff like burning CDs, I mean they were doing this stuff I didn't even know what they were doing.

Principal 4

Q1. How do you foster a shared technology vision?

The entire school vision is created by the staff, so if technology is going to be the part of any school it would have to come from the administration and the

teachers. What we do is... whether or not it's sharing or whether it's using it we do use the computer a lot as far as correspondence and what we do is through that use that becomes a part of the daily life of the teachers and the school, so it's just by example and by just becoming incorporated into the daily life that it becomes part of the vision.

Q2. What do you do to advocate "best practices" in technology?

There are six or seven minimum state standards that all teachers...all professional staff, not just teachers, must show proficiency in by the end of their year. Whether or not it's each year or whether it's the first year, and tech coordinator, what we do together is, each teacher, on a personal basis, we sit down and we decide where that teacher is as far as the different requirements and how we can provide courses. There are ETTC courses, there are courses that are technology coordinator does himself... the district provides courses for technology, so by providing those opportunities to the teacher, That's how we work out... each school has a technology coordinator.

Q3. What do you do to promote technology integration in curricular design and instruction?

Well there's two basic things as principal you ca do very easily. One is to look for it in the lessons, they submit lesson plans for review and I look for the technology use in their lesson plans, and secondly when your doing observations you specifically look for the technology used in the lesson that your visually part of that your seeing.

Q4. Describe the degree of assistance that you provide for teachers to utilize technology to access, analyze, and interpret student data?

Actually not yet. It hasn't gotten to that point.

Q5. How often do you provide, design, or support technology-based professional development?

Again, as a school...I never do it as a school because there's no place here to provide that for thirty, forty, fifty people, so it's always on that individual basis that I was referring to.

Q6. What type of technology-based record keeping system do you/teachers use?

The only one we have in the district, as far as the whole system is UNIX. The programs, of course they set up their own databases if they want to use Excel, if they want to use, what's the other one that I'm not familiar with, I forgot the name of it...it's art of the office program...Access, that's the one that actually I'm looking for courses in...that could be very...that's like a real database program where you can really integrate a lot of different things.

Q7. What type of technology do you use to communicate with peers, experts, and educational stakeholders?

The major form of technology that I would use is basically the e-mail. I mean we send each other documents, messages, articles...

Q8. How often do you provide opportunities for staff to share technological innovations with one another as staff development?

Formally, we have grade level meetings, and that happens once a month, and what teachers are invited to do, not just for technology, but technology's one of

the areas, is they come and talk about like...what we call it is like the "one feather". It's the one thing they're proud they did this month, just to get those good ideas going around.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

Were not really at that point...teachers...whatever I model to them, they don't have access to at all, so it's...

Q10. Are the staff's technological proficiencies, as measured against current technology standards, important to the assessment of instructional staff?

They're the standards the district gave us, and I know the technology supervisor has incorporated standards from the state in that. Whether it's a direct correlation or just to use as ideas I couldn't answer that. I do know that's where a lot of these were coming from.

Q11. What type of word processing do you use? How do you use it?

The word program is basically the word processing program that I use. The office package...I use the word, I said the word, and the Excel's not a word processor, but those are the two programs I use. I really don't use any other word processing.

Q12. What type of database applications do you use? How do you use it?

The only thing I use the Excel if I'm going to do some kind of a mail merge. I would use Excel to set up that database. Anything further than that...no...except for setting up simple databases and using those instant mail merges.

Q13. What type of spreadsheet applications do you use? How do you use it?

Again. The spreadsheets as far as making a spreadsheet and getting some very simple formulas that I can use to help cut my, you know like the little stuff and like the adding, subtracting, totaling. Thing like that I do.

Q14. What type of e-mail do you use? How do you use it?

No Response

Q15. What type of presentation applications do you use? How do you use it?

We do PowerPoint. A lot of times...there's a lot of committees...your always on a committee somewhere, and it's...the district actually really tries to push you to make presentations via the computer. So whether it's the PowerPoint, whether your using the LCD projections, on the machine, whether it's simply just having the PowerPoint printout, you know to go along with what your talking, cause it's funny, as much as technology works many times you go to use it...your glad you have those handouts. It was supposed to cut down on all that, but you can never trust it.

Q16. What type of desktop publishing do you use? How do use it?

See the uhm, tech coordinator does the school newspaper, so he uses a desktop publishing program, I'm not sure which one it is. I don't use one myself.

Q17. What type of world wide web navigation and search engines do you use? How do you use it?

Those, to get information, I also teach courses at the alternate route program here in district, so I use the Internet all the time trying to research anything I have to present to them. Also, not just for myself, but the students...that's something they really...you give them a topic to look up in the library, and then you give

them the same topic to look up on the Internet, they will do... they're so much more focused using the Internet than going to the library. So, it's almost like a given that if you want to get them engaged, just give them a focal point, just look this up on the computer. It really is, it's classroom management almost.

Q18. What type of statistical applications do you use? How do you use it?

No Response

Q19. What type of class scheduling applications do you use? How do you use it?

The tech coordinator... our class scheduling as far as using the computer to schedule classes? No. We don't... that's... the school right now as you can see right there that's the schedule. It literally does not take a computer to do it. It just takes me to sit down... this is a smaller school. At the high school, I could see them using it. One time I took a course... a workshop, I forget which program it was, but they were talking about scheduling like two thousand students in a high school setting where you had seven eight periods in a day. But that's not the case in elementary.

Q20. How many students are using technology for basic-skills acquisition?

For basic skills right now, the students use that in the after-school program. If your asking for numbers of students at the end of the year, I would say we have seventy-five in each cycle... I'd say about three-hundred students, three, three-fifty by the end of the year if we use it for after-school program. And then during the day, within a given week every child is on a _____ basic-skills language arts, basic-skills writing or math, they do go on the computer for that.

Q21. How many students are using technology to achieve higher-order thinking skills?

That, I'm going to honest with you, I wouldn't say that was a high number; we're trying to push that, but yet the teachers...I have to get the teachers to understand and use that kind of technology, because right now, I think it's thinking of using higher-order thinking skills instead of just using it. You know what I mean? It's a natural step, but it's slow. So I think that getting the teachers to get on board and...because I mean they're very cooperative...it's more of a I'm going to use type of thinking instead of I'm using it.

Q22. How many teachers design and implement technology-based learning experiences that promote higher level learning, and authentic assessment? How is this done?

I'd say probably right now about three or four.

Q23. What technology resources are available that supports specific topics or lessons? How many teachers utilize these resources?

Its' two fold. The media specialist and the tech coordinator...The library class itself...we changed it this year. It's no longer pull out where they come down to the library and just sit there and you know sit there in the library and read a book, stuff like that. The librarian goes into the classroom to integrate the library skills and the use of the library in a lesson. An example of that is one of the fifth grade teachers, they have a social studies report due...Part of the requirements of that report is technology, they have to show that they used technology. She's not telling them how, she doesn't care if they create a picture with their report on the

computer, if they used the research, if they type it on the computer, she's not telling them how. They have time... she broke up the... it's over a period of about three weeks. Students in groups of four come down to the library with the librarian talk over with him how they want to use technology and he guides them from there. If they want to do research he helps them go on to the different search engines... different things like that. If they want to use more of a graphic program, that's where he guides them, the tech coordinator helps us with that too.

Q24. What is the availability and accessibility of technology that supports varieties of teacher and student experiences?

In _____, I don't know if this is the first school you've been to, each classroom has four student computers hooked up to the Internet and there's a teacher computer also, a teacher station with a TVator in every classroom. So, like the world language teacher is constantly using PowerPoint to present her world language lesson. The kindergarten class every morning, the one kindergarten class I'm thinking of, talk about we have a fifteen minute called calendar math. You talk about the days, you know you learn counting, you learn sequencing, you also learn about weather, because that's one of those thing they have to do in kindergarten. They have the weather station on... I mean like on the Internet... the weather you know on whatever state, and they talk about different places and they look on a map to see where that place is, so they use that. So the teachers I would say do a lot more in language arts, science, and social studies, cause our reading... our Whole School Reform model is SFA. The reading and the math program is very structured, very prescriptive, so there's not a lot of time

that they allow...SFA has not incorporated computers in their plan yet, so they can't do it during that time very easily, but in the time they create their own lessons, that's where they do more of it.

Q25. How are technology resources being allocated, e.g. staff development?

We have...there's actually...the whole budget just got completed. We have two hundred dollars per staff member not just for technology, but technology's included in that to get professional development training. We also have an a lot of money to buy like the different software packages, and not necessarily software but like the disks, but they can just put a program on the computer for the teachers to use that, and like I said, hopefully...I hope they get a program like SASSI, just if they could just get the information, if they could get attendance to student data-bank, if they could get all that information in the classroom, it's just inherently going to be better for them.

Q26. What building level organizational structure exists that supports all aspects of technology?

As far as organizational, the only thing I can think of right now, unless I'm misinterpreting the question, is just a full time tech coordinator and the media specialist who both support the teachers in any way. The district is also supportive in bringing in people. If the tech coordinator can't or is busy in class, they send a person over...to do, like fixing a computer so he doesn't have to take up his time being maintenance...they send someone in, so it does free up his time just to do more of the integrated technology into the curriculum as opposed to being a handyman.

Q27. What is the extent of community involvement regarding technology in your school?

I'm actually pretty exited because I just got two parent just this last week started e-mailing me, and that's the first two parents I've ever had that really started to... On our letterhead and our booklets we always give our e-mail address, and I was always just waiting to get an e-mail, and two parents in the last week, so I'm pretty... it's small, but I'm happy that they... I mean, that they were first people I responded to, cause I just wanted to keep that going, and we also have a web page... the district as a whole, each school has their own web page that we up-date the reading scores, with the calendar, with different up-coming events, with pictures of things that are going on, with the newsletter... we put all that on our web page for the community to see, and the tech coordinator is part of the technology plan, provides parents with technology training. So, they can come in and learn how to use the computer.

Q28. How is technology used to align standards, curriculum, and assessment?

As far as the extent that technology has been used, everyone has that information stored as far as further use, I really would say no.

Q29. What percent of students have continuous access to technology in school?

The in room computer usage, I know for fact the teachers do allow, like I said mostly in general language arts, science, and social studies, time to do projects, to do research, to look up things. The free time, we have a half an hour block of recess, when it's cold the students stay in, however we cannot allow the students on the computer because there's not a certified staff member in that room

watching what they're doing. So, that's a drawback. We don't have the staff personnel. The same with the library, we only have one librarian, and he's now in the classroom so the time that the students would normally, like your saying, they could just schedule to come down, we can't do that cause we only have one librarian. So now it's a scheduling, if the teacher, like the fifth grade teacher is scheduled him during that time, that's where he is to help those students that she sends down, but after that project is over it would take another teacher to schedule him, or he's going around the classrooms. So really if there were more personnel that we could certainly provide to do that, that would help because assistants are not allowed to stay with the students to do that.

Principal 5

Q1. What is your vision of technology and how do you foster a shared technology vision?

I've used this example with my staff. I have a three and a half year old son and a one and a half year old son, and my three and a half year old son runs circles around my lap top. He clips and pastes, he's all over. He's on web sites he checks his mail, he's on word, and he's three. And, if we don't address it in the schools then I really believe we're missing the boat, as far as technology's concerned. So I'm looking for vision wise is to incorporate it as part of the learning environment to use it as a resource, as a way to teach integrated with the learning process. It's just part of our lives, especially children's lives.

Q2. What do you do to advocate "best practices" in technology?

The technologies themselves that so many of them advocate best practices just has to be a commitment from top down and throughout... it's got to be support, it's got to be staff development, it's got to be continuous. You need people to support it and you need them to believe in it, but it all comes from the leader of the building, or some key people in the building that are dedicated to it. I've become dedicated because I see it works well. I will stop anything I'm doing to fix someone laptop or help them out with their electronic grade book and I have a few key people in the building that assist me also. So the dedication and the commitment is the only thing I really believe you need.

Q3. What do you do to promote technology integration in curricular design and instruction?

I took part in a really nice workshop this summer called new Jersey ELITE, NJ ELITE, it was a Bill Gates grant, a five point one million dollar grant to train superintendents, principals, and administrators in New Jersey in technology. The main focus for me, or the main plus of the workshop... it was a four day workshop, was the networking piece. The networking piece seeing what other districts do, how they work, what technologies they use, and that connecting was a very good piece. The actual technology didn't really... wasn't mind-boggling, it was just... The support, they gave out excellent resources and materials that we could use. This is a phenomenal resource bank of anything from software to web sites to anything you could imagine. So, making the connections with people, networking with people, seeing how it's done in other districts, is the way that we would try to support it and implement it. The superintendent that used to be here

in _____ is really a visionary in technology his name is _____, he really brought the vision to _____, and I sort of went along with it and it works really well here because we're so committed to it.

Q. Was it the district's idea to send you to ELITE?

Sure. The district's very supportive of staff development in that area, though it really comes from myself, it comes from the staff, what I feel they need and they will support sending administrators and teachers to support technology.

Q5. How often do you provide, design, or support technology-based professional development for your staff?

It's on-going actually we do a couple of really neat things in the building. I will regularly have support groups and technology training that I will conduct after school every couple of weeks, once a month, through faculty meetings. It goes on throughout the day, but we also in this building have a unique piece in the schedule, it's called the professional development period, where all of our teachers are off in different periods. There are six periods where every staff member meets as a group and what we've basically done is conducted a professional development class through that period of the day. So we in-service our own technology, we did a piece on digital camera technology, showing the teachers how to use it, importing it into PowerPoint, using it in the class. So it's happening almost every day. Not necessarily technology every day, but we're using it. We do research in the professional development period. How do we get the research? We do it via the Internet. All of our teachers have wireless lap top computers that they have with them every day so they bring them to their

professional development period. So we're using this technology as a staff, and once we're comfortable as a staff, so then the rest will come down to the kids. That I think is the biggest boundary that we face in education, is getting the staff comfortable with the technologies... it's not their world... it's not their paradigm necessarily. It's a combination, it's such a range of top to bottom as far as use in the schools with technology these days.

Q. Is the professional development period weekly?

Daily. Every day. And _____ has actually been a big instrument. We sit there literally once a week and we design lesson plans that range from an agenda to studying a text of middle school philosophy called Turning Points 2000 and we give them a weekly overview. We do discussions, we do training, we read articles, we read research, we go to the Internet.

Q6. What type of technology-based student record keeping system do you and/or teachers use?

There's three pieces. The main component is called SASSI. It's really taken over. It's great stuff, and what happened is... I was the vice principal before I was the principal, and the principal before here was here for twenty-five years, the only principal in this building besides myself, currently. As a VP I was able to, in the last three or four years really get involved with SASSI, and get involved with the administrative technology coming in to the district, and I've gone out to Reading where they do the training and have really become an expert in the system, and through SASSI an off-shoot of it is INTEGRADE PRO, through that SASSI also another off-shoot is PAIR Connect, and it really effect the whole entire school and

the district, it's really a very powerful tool. What I've found is that I'm one of very few who know how to use the program to its capacity, cause it changes regularly and up-dates regularly. You have to use it and I do use it... it's not a secretarial tool it's really a good teaching administrative tool.

Q7. What type of technology do you use to communicate with peers, experts, and educational stakeholders?

I use my computer regularly, we e-mail regularly. The big technology that we us in this district is an electronic grade book that's really been an off-shoot to how the staff gets involved. Al of our grades are done electronically on a grade book and it gets... it actually... it's imported into our administrative system and then we have a third piece that's called Pair Connect, Pair Connect puts the grade book or a copy of the grade book out on the web and then parents through a pass word and I.D. number can see how their kids are doing. So it really fosters the communication between the school and the parents. Parents can check it at work, daily, it's really great stuff.

Q8. How often do you provide opportunities for staff to share technological innovations with one another as staff development?

We're moving, and... everything I'm throwing out at you we're doing a lot, but we're not there yet. We're not even close to there. I can tell you half the building still has problems with just doing a basic web search. So we think that the sharing piece is really important, so we want people to teach each other, we want our teachers to teach each other, we want the kids to teach us what we're doing. We do want to share, sharing is so important, and it's not only sharing it's getting

those people to use it. It's funny I taught one of our professional development periods earlier in the year and I was doing the whole thing on...we're studying a book called Turning Points 2000, it's a middle school model for education. It's a very standards based book, nurturing middle school environment, it's a good middle school book. And, the first thing I did was have them do a web search, on just go to the Turning Points site, or get any information on Turning Points 2000, and I was taken back, you assume, you can't assume...people struggled...how do I get to the wireless network? How do I turn on the computer? Do I have the Internet? How do I type in Turning Points 2000? Should I have a space? This is what I got. What does it mean that it has two thousand hits on it. And yet we're considered an advanced efficient district in it, so it's got to be...that work....you have to get people to use it and we're making them use it.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

That's really critical. We make all...we try to make all of our decisions based off of data, and results. It's one of the seven principles in Turning Points 2000 and we try to back it up. Before I get to the educational piece, just something we did discipline wise, it actually has a whole discipline component, we address and we interpret the data on classroom management that way...see where our weaknesses lie, what events are re-occurring throughout the building and how to address it. The faculty...the building was a little soft on discipline. By the way we don't have any fights in the building, it's a clean building, it's a great building...and then when I looked at it, it turned out that there were two or three teachers who had

the majority of the incidents, then I put it back to the teachers, and they were taken back by the data, and so I could turn that into even student improvement. If we target those people, tell them how to become better classroom managers, then that in turn they'll become better teachers and then in turn the students will become better learners. So that's one piece. This New Jersey ELITE program that I just told you about has an extensive technology survey involved with it. What I did is that we set up an account for the entire staff to take a technology survey. What was great is that all you did was enter their e-mail and they would send the staff reminders that they had to finish their survey, so we got the whole staff to do it, one hundred percent, and they in turn are sending us a report analyzing our strengths and our weaknesses, where we need improvement, where we need to grow, and in turn that will improve instruction, and that will in turn improve student learning, so those are only two examples, I could find more.

Q10. Are the staff's technological proficiencies, as measured against current technology standards, important to the assessment of instructional staff?

I've not held it as criteria for evaluation. What I've done is just become such a support for them, that whenever they're ready to go even if it's taking a picture of a class. We're introducing it slowly, so I just want them to see that it can be used as a tool to make the class more exciting to improve student learning, to make the classroom better. So, I don't base my criteria, I don't evaluate how good somebody is technology wise, I ask for it on interviews. If they can't handle a basic computer, and basic Office applications, and electronic grade books, it does put onus back on me, so staff development becomes more intensified and my

time...somebody said something to me last year, "do you feel that your time is being used wisely by taking all these breaks and supporting it throughout the day? We just work really late hours and that's what's happened in turn. Yes and no, I really believe that I'm still committed, that the program works because of the commitment. If I wasn't committed to, it would just phase out, like everything else, it would fizzle out, you would get your super-stars that would use it regardless, and it would just sort of fizzle out. This way with the commitment it might not be...everybody might not reach that high level, but everybody uses it, and everybody has certain expectations to become proficient and keep on trying, and keep on becoming better and more proficient in using the technology. So again I don't use it in the criteria to evaluate staff, but I encourage them and I support them and I push them to use it as a way to increase student learning.

Q11. What type of word processing do you use? How do you use it?

I guess the next generation of administrators, I'm considered a young administrator, or the next wave of administrators. I type all my letters, I do all of my memos, I don't use an office manager as much or secretary...end up doing most of it, a lot of it myself. However the administrative program SASSI I would be nothing without my secretaries who now have become so confident in exporting and handling and managing the system, that it's really a big relief. Yet, you don't want too many hands in the pot because it gets broken, and so I've restricted certain people do certain things except myself. I do all the scheduling through the program, I do all the grades setup myself, I do all the module order and securities setups myself, so I'm indebted in using the technology daily. You

see the Palm on my desk, I just got involved in a Palm 3C which is behind the times actually. You know, I just picked it up and it's too much fun, it's really great... it's just going to... it's just another piece that I'm going to use, so I use it a lot and yet it's good when the server goes down and the power goes out because then you have to pull yourself away, and it's amazing how many other things are there that you forget about because you almost become reliant on it, and you forget what it's like to do without. I have a desktop and a laptop, I literally go back and forth between these two things and my hand hurts sometimes and sometimes you have to break away, and when it clashes it's the best thing that can happen, cause you can do other things that you tend to forget about.

Q12. What type of database applications do you use? How do you use it?

Database applications, we use EXCEL extensively, I'll show you I just set up for the district... it's funny the district giving you constructive criticism has all the bells and whistles but doesn't have the players to use it or the support to use it in the right direction. We have a placement, special education placement for students, and nobody knows where kids are going to be placed, so I know that the child study team in sixth grade and fifth grade just basically exported the kids out into EXCEL and created a form for all child study teams. When they're done with an IEP they fill out a check list, resource room., in-class support, and basically my secretary just enters the data and it just totals up the data and will give me numbers, accurate numbers on placements next year, very simple but incredibly powerful, incredibly powerful tool, and so organizationally I use EXCEL and anything that can help me organizationally and it's a very big powerful

thing...SASSI, one of the great things with SASSI is it exports data, imports data, it bring things in and out, it's one of the better technologies that I've ever used.

Q13. What type of spreadsheet applications do you use? How do you use it?

The spreadsheet I do believe is similar to the EXCEL program. I use Microsoft Office applications. I've become proficient...I don't know if this is the next question but I use PowerPoint as a way to present to the community, and the staff, and the children. We do imbed it into our curriculum, our students do use it. I use it to present. The perception of the technology, the basic PowerPoint presentation, your perceived as very high knowledgeable, and it's just really a very simple Office application.

Q16. What type of desktop publishing do you use? How do you use it?

I use Microsoft publisher, I use Print Shop, anything that comes around I like to press the buttons and then you learn, some-things you like sometimes you don't it's just a matter of time management, who's got time...I told you about the Palm, I should have been using the Palm five years ago with my proficiency but I just never did it, just wasn't something that I was doing then, now it is and that's O.K.

Q18. What statistical applications do you use? How do you use it?

Yeah statistical applications, this electronic grade book is one of the neatest things I've ever used in my life. Let me show it to you. I want to show you how the statistical analysis can be used. This is a record of every grade that a teacher has and their classes. This program is so powerful as far as statistical analysis and is so under-used that if you look at the statistical analysis of this program it does anything from stanines to T squares to quartile ranks, it's an incredible tool.

You can then graph student performance, compare tasks, correlations, compare tests, compare what works in one class compared to another class...incredibly powerful stuff...scattergrams, correlations, it's a powerhouse statistic-wise. How much do I use it? About the same way that I do, and I will when it applies. When I have to make decisions that are based on the school and our achievements then I'll use it, but I don't use it as much as I could, but I'm familiar with it and a lot of people are not familiar with the power that exists behind statistical analysis.

Q20. How many students are using technology for basic-skills acquisition?

We have a really small basic-skills population, we have a high functioning academic school district.

Q21. How many students are using technology to achieve higher-order thinking skills?

I would say...seventy five percent.

Q22. How many teachers design and implement technology-based learning experiences that promote higher level learning and authentic assessment? How is this done?

I'd say between thirty and forty percent, thirty percent.

Q23. What technology resources are available that supports specific topics or lessons? How many teachers utilize these resources?

We have a couple of different programs. We use Educational Structure to design lesson plans AOL At School is a good reference. We also use technologies such as Gateway Destinations in our classrooms where we have it. We have Obviously

Unlimited... we use an INET library which was a reference educationally for teachers to use as far as Internet access is concerned.

Q24. What is the availability and accessibility of technology that supports a variety of teacher and student experiences?

We have two computer labs with twenty five computers in each lab. In other classrooms there are three computers in a growing majority of classrooms. There are these Gateway destinations which are big screen TV hooked up to DVD players, the Internet, VCR's, laser discs, any type of technology that you'd like to put in on it. Everybody is Internet accessed. Everybody has there own e-mail account staff and student-wise. All staff is on a wireless network with there own laptop computers, so there's all there for people to use. The only problem we run in to is the support, the human resource support piece on it, we don't support it enough, and the equipment is not changing as quick as the technologies are changing, so we're running into old equipment problems.

Q25. How are technology resources being allocated, e.g. staff development?

We did it all too fast in my opinion. We have all the bells and whistles and... but now it's suffering from going too fast I think. I really believe that we need more human resource in this building, in this district. We have one guy basically that runs the networks and supports the technology for six schools, and I'm lucky because he sees that it works here, so he likes hanging out here and he doesn't get bombarded when he walks in the door here because I troubleshoot a lot of the problems myself, so he's able to become effective and he sees the technology works here so he's here to help us out.

Q26. What building level organizational structure exists that supports all aspects of technology?

Building level organization? Myself, which is really an integral pat of this organization. The vice-principal is also in place. We do have a computer teacher that the morning part of her day is allocated to staff development and technology support. We have two other people in the building that are considered technology support people that will help out in basic troubleshooting such as changing printer cartridges and helping machines boot-up. And then, what I try to do is promote leaders from within, teachers that do well in technology and are proficient, and I want them to help and support it at the building level.

Q27. What is the extent of community involvement regarding technology in your school?

There's one piece of community involvement, it's an organization in _____ that supports technology, they work with businesses to help bring things into the building. We do not have a lot of community involvement. We should have more. What has been nice about this district is that it became a model district for technology because of the superintendent that was here before, so many companies outside the community came to our building, came to our school...pilot this for us...we want you to be the pilot district for this program. The Para-Connect program I was talking to you about is...we're the first in the Northeastern part of the United States to do that. We reap benefits from becoming a model district in technology. Companies outside of the community came to us because we would use it and try it out.

Q28. How is technology used to align standards, curriculum, and assessment? As you mentioned, it should be used to help critical thinking and higher learning process. We have lesson plan templates, if it was truly designed...it was our original template had the core curriculum standards imbedded into the program, so people would be able...teachers actually design their lessons are able to include the standards on a drop down which would then help them to plan for better lessons. We do have a template that teachers use to keep a library of lesson plans and help them become better master teachers, creating a book of lessons daily and then being able to adjust them through the years and make a collection...and then these people become master teachers which would lead right in to teaching from the standards which is what we're striving to become.

Q29. What percent of students have continuous access to technology in school? One hundred percent unless they lose their privileges, you know, on their own. Every student, every staff member has access one hundred percent of the time now. It's not fool proof, it breaks, it's human, it's only what we can give it a lot of times or what we know what to do with it, but everybody has access if they want it.

Principal 6

Q1. What is your vision of technology and how do you foster a shred technology vision in your school?

What my vision would be? Let me just start with this. We had a technology maven here, a male person not a woman, I don't know if maven is male or female, and that person was in charge of our technology. We have very little, the principals,

to say about it. As a matter of fact when I started, I was probably most concerned with the fact that I had very little to say, nor could I get any kind of input as to what was happening with the technology. Now I say that in the past, because over the last six months we have basically fired that person and fired somebody else, but we're caught in a big technology mess, we're a mess! This was a very technological school. They used Learner Active. Learner Active is a style of teaching using computers to do research and small group process as the main learning tool for children. So, we're talking about big time technology people here. The teachers were big time technology and then of course we had laptops, teachers had laptops, we had computers in the classroom, we had Internet access, we had all kinds of things. And then, this guy came in, took everything away, and so for the first year, last school year, my teachers had literally nothing. Because I think, and I can only say because I think cause I wasn't here when he was hired...I had nothing to say about his being hired...probably had a lot to say about him departing, but the machinery was starting to fail. There was no infrastructure. They weren't networked with one another. Some had ports in their classrooms and could get out, some couldn't, but whatever, nothing was unified. So the concept originally which would have probably been mine, so here's how I get to my vision, to network all the classrooms in the school together, to network the two schools together, and to network...we have three sites; board office, two schools. So that we should all be networked together, we should all be able to communicate with each other, and we can't, we still can't. I can't on a regular basis communicate back and forth. But my vision would be,

every classroom should be connected to the Internet. Every classroom should have a computer in it that allows children to do real-time research. Upper-grade classrooms should have four to five computers in them that allows the teacher to use the concepts of Learner Active and use the small group process and the research children can do through the Internet to...and use the technology to its fullest, and there should be a centralized either library or computer room where the whole class can come and that computer room should or library, I'm not sure which I prefer, should have enough computers for...so each child can work on a computer so an entire class project can be done. That would be my vision. My vision would be that the computer would be a seamless tool used in the classroom to aid instruction. Not an end all be all, not something to teach typing on, but a research tool.

Q2. What do you do to advocate "best practices" in technology?

I've done best practices. I wouldn't even go near best practices in technology. I wouldn't.

Q3. What do you do to promote technology integration in curricular design and instruction?

I had said to you that we got this guy fired and we got somebody on here who loads on to the computers in the classroom the pieces of software that the teachers have purchased that supports learning. So, we now have a technology person who will load onto the computers that presently exist, the software that the teachers want. The computers here...everything was taken off the computers and he wouldn't load any software. It was a nightmare. OK here you go...I've got a

laptop... that's a screen, just a screen, the computer's actually in my laptop. I could not get to the control panel in my laptop. I was locked out of the control panel. And I said I want to get to the control panel... I wasn't... we finally referred to him as the computer nazi. We used to do report cads by hand, he was going to see that we got... he promised us in October or November, when I first got here that by the end of the second marking period we were going to have a way to scan in grades and do a grade program and produce report cards... well, we still don't.

Q4. Describe the degree of assistance that you provide for teachers to utilize technology to access, analyze, and interpret student data.

I can tell you the teachers here are very, very well versed in the use of technology. They're very well versed. They're ready to roll. We need to provide them the hardware to let them do it. Just the opposite as in many schools. Many schools don't have... for years and years and years these people were trained in Learner Active which includes the use of computers, so they're very computer knowledgeable. That' been happening over the last I would say ten to twelve years. So the teachers who participated in that training are very, very knowledgeable. They have science teachers who use it for real time research, they use word processing, they produce news letters, they use it as part of a writing tool... haven't seen it used too much in math, I've seen it used quite a bit in social studies, seen it used quite a bit in literature, I've seen it used extensively by the two science teachers.

Q5. How often do you provide, design, or support technology-based professional development opportunities for your staff?

We run a professional development academy. The school district runs one. It consists of two days where the children are not here but the teachers are, as well as a series of after-school programs. There must be twenty to twenty five offerings one after-school four to six, four to five thirty, four to seven that the teachers can take. Some of these or a portion of these are computer; doing a web page, using Internet as part of your technology... as part of your classroom, things like that. So that's really good. The new tech guy is a software... he's not a hardware person, he's a software person. So he's putting the software on for the teachers and also try to teach the teachers how to do this other thing. He's established a web page for the district, so we're moving along.

Q6. What type of technology-based student record keeping system do you and/or teachers use?

None.

Q7. What type of technology do you use to communicate with peers, experts, and educational stakeholders?

I use the computer program I have to do a newsletter every month... incorporating pictures that I take with the digital camera into the newsletter. So, I'm pretty versed in using that... the computer as a tool to create hard copy that I send out. We've just established a web page, a district wide web page, so we're moving along with that.

Q8. How often do you provide opportunities for staff to share technological innovations with one another as staff development?

Well I would say that we do that pretty regularly. I mean the new tech guy is doing that, and previous there was a lot of training done in this district, they did Learner Active a thousand times because Learner Active was what they did here, and it's what got people trained.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

I model it in...I mean I don't use e-mail because we can't e-mail each other, but I do use it...I've really up-graded what the newsletter looks like. I guess that's my biggest claim to fame. Let me say this, digital camera existed in this building nobody used it till I got here. We have a projection video and PowerPoint, nobody used it till I got here. I'm pretty conversant with PowerPoint and I use PowerPoint in my presentations in my work with the professional development academy and the courses that I teach. I use it for faculty meetings. So I use it for training, staff training and development. PowerPoint. Do I teach them how to use PowerPoint? No. Most of them know how to do it. So I think I model using the tools that we have to the best of...use what we have! We can complain about what we don't have but I try to use what we have.

Q10. Are the staff's technological proficiencies, as measured against the current technological standards, important to the assessment of instructional staff?

You mean when I do evaluations of the staff do I use their techn...what they do technology wise as part of how I'm evaluating them? I really don't. A lot of them use it, but because of the technology problems that we had, I couldn't. On any given day the Internet's not working. We have hardware problems that are not

solved. We have a server that doesn't have enough ports to support all the computers that exist on any given day, particularly in this building, Internet access could be down. So if I say to teachers, when I come to watch your lesson I want to see technology, well on that particular day it might not be possible. Every classroom doesn't have computers; fifth through eighth have computers, a combination of Macs and PCs. Below that there's no consistency to what they have. They have some. Some of them have old Apples. I mean there's probably something in every classroom, but nothing of note below fifth grade. So I really don't think, I see it used, it's used quite often particularly in the upper grades, but I don't see that it plays any role yet in my evaluation of staff.

Q11. What type of word processing do you use? How do you use it?

I use Microsoft Word. I use it for everything. The secretaries type half what they used to type because I do it. It's easier for me to phrase on the computer.

Q12. What type of database applications do you use? How do you use it?

No Response

Q13. What type of spreadsheet applications do you use? How do you use it?

No Response

Q14. What type of e-mail do you use? How do you use it?

I use some e-mail. I don't necessarily e-mail the staff

Q15. What type of presentation applications do you use? How do you use it?

I use that extensively.

Q16. What type of desktop publishing do you use? How do you use it?

Publisher. Microsoft Publisher.

Q17. What type of world wide web navigation and search engines do you use? How do you use it?

The computer nazi would determine what search engines we would use. I can tell you that they would not, they would not, would not, would not give me access to my e-mail account. I could not determine what password I wanted. Somebody else determined what my password would be. I have an e-mail address. I use my e-mail address for professional interactions that I have. I have a business card that I give out and they didn't want me to use my e-mail address, they wanted to give me one. It's changing slowly, but it was pretty miserable for a while. It didn't change, by the way, until he pulled the same thing with the new business administrator and the new business administrator said what are you crazy, I need access to my control panel.

Q18. What statistical applications do you use? How do you use it?

No Response

Q19. What type of class scheduling applications do you use?

No.

Q20. How many student are using technology for basic skills acquisition?

The basic skills teachers... Title I teachers have computers. So, my guess is that at some point those children use it. Sixth, seventh, and eighth grade teachers have four computers in their classrooms that they can make use of in any way they want to including that. So, I would say we have the opportunity if not extensive use of computers for that.

Q21. How many students are using technology to achieve higher-order thinking skills?

For that I would say that's what it is used for basically in sixth, seventh, and eighth grade.

Q22. How many teachers design and implement technology-based learning experiences that promote higher level learning, and authentic assessment? How is this done?

I would say my sixth, seventh, and eighth grade teachers who were trained in Learner Active are doing that on a regular basis.

Q23. What technology resources are available that supports specific topics or lessons? How many teachers utilize these resources?

There's a lot of software available. The teachers for years were given...teachers for years under this Learner Active program...we didn't buy textbooks, we bought computer software. It's almost like they went to the extreme. We're going to use computers and Internet around here, and the parents said where's the textbooks, and so they became disenchanted over six, seven, eight, with that. So under a new superintendent we've sort of come back to the middle. Where we're using Learner Active the skills of the teachers learned, but now we're buying textbooks too. So there' a lot of software on hand. We had a lot of money. In a district this size maybe ten thousand dollars a year devoted to buying computer software. It's been the possession of each individual teacher. It's not cataloged. It's not in any one spot. It's the teacher's possession. You can't do anything in the extreme. I think you have to use the technology as a tool, but it's not the only tool. There's

sometimes when...OK maybe you don't need a fifty dollar text book, but maybe you need a workbook that kids can take home and at least have something in their hand they can do homework from, even if they don't write in it, even if they have to write in the notebook, but they have this book. The parents say what are you studying in science, the kid would say I can't show you, it's on the computer at school. Now at least they could see. So, we've pulled it back a little bit. There's a new textbook in science coming out, there' a new textbook in social studies. We brought it back a little bit to the middle.

Q24. What is the availability and accessibility of technology that supports varieties of teacher and student experiences?

I think some of the special area teachers have difficult...for example, the health teacher, the phys ed teacher who teaches health. I would like to see him and her use more computer Internet information in their classrooms, but they don't necessarily have access to one. The Spanish teacher who might be able to incorporate some of the things that he could get to in his lessons doesn't have access to that in the classroom. There are still pockets of people who could use the computer better if we had more access.

Q25. How are technology resources being allocated, e.g. staff development?

Right now...well when we had the computer nazi, he determined it. Now we have a new guy who also seems to be determining it, but I'm hoping in this budget process that principals have a little more input.

Q26. What building level organizational structure exists that supports all aspects of technology?

There's one principal in each building. There's a vice-principal that goes between two buildings, and the only other person...certainly the superintendent and the curriculum coordinator, developer, have obviously some say, and we have the technology person. Where do we stand in a hierarchy? I guess the superintendent is taking ultimate responsibility for what's going on. We let the technology person know when there's something going wrong in our building, and comes and tries to help us.

Q27. What is the extent of community involvement regarding technology in your school?

I guess the community involvement became, we want to see something more than just Learner Active, that wasn't enough. The culture, they got so into this, the cultures changed. Sixth, seventh, and eighth grade classes do not have desks, they have tables for small group process, but that means that every thing you do is at a table. Imagine...some of them are smaller than this, four kids at a table, what do you do when you want to give them a test. So quite frankly, They went to the ex...they went way out and eventually it had to come back.

Q28. How is technology used to align standards, curriculum, and assessment? With the Core Curriculum Content Standards there's much more that can be done, we're not using it in that way at all.

Q29. What percent of students have continuous use of technology in school? That percentage of students would be around four hundred and fifty kids in school. Sixth, seventh, and eighth graders have continuous access. Every

classroom you go into there's four computers...I would say half the students have continuous access...their classrooms have computers they can use at any time.

Principal 7

Q1. What is your vision of technology and how do you foster a shared technology vision for your school?

It's been about three years since we actually had a technology teacher, that all came about primarily because we're an Abbott district and with those funds all of those schools now have a computer lab, and initially when it was open it was a Mac Lab and the person they hired as our computer teacher is really a PC person, but knew of Macintosh and had come out of Newark. She taught there for one year, she's a local girl, she went there to teach a year, so came with experience, and we have a fantastic program now. The lab is now half Gateways and half Macs. All the classrooms have three to four computers, at least one Gateway in every class. She has done training for teachers who were so apprehensive and now so comfortable with working with the computer, I mean it's still not where we would like it to be, but they're at least using the computer; the computers are on during the day. So, she has....she does collaboratives with teachers as well as doing it alone with the class. We have a lunch program where the art teacher teaches graphics on the computer, we cycle upper grades through the lab in their lunch hour, so we have that program. We have a teacher who is working on a news paper, a new teacher that came to us three years ago, who is very proficient on the computer and now she's doing our news paper, and has gotten two or three other teachers involved so the students are learning the

graphics of putting together a school newspaper and that really triggered a lot of skills and children's excitement, you know writing and producing. The tech teacher is teaching PowerPoint. We had a summer program and she had children just coming out of first grade to children in sixth grade and they learned PowerPoint in the summer, because then there's seven school and another school in town, we're part of the William Paterson Partnership Grant, and they had given us twenty thousand dollars over the summer for summer programs, we turn-keyed in September to all the practicum, the student teachers that came into our town which we did, and then they gave us additional funds to buy computers, so that's been a big help. They provide professional Training. They have now sent us... there's this woman... every ETTC I'm sure your familiar with that. They gave a sabbatical to one person, each of the counties gave a sabbatical, and this one woman _____ _____, received a sabbatical from state county, and because we're aligned with William Paterson she spends one day a week with us and is in the classroom and as they teacher is teaching shows her how she can incorporate the computer into her teaching; which sites children can go on, having children come over to the computer and actually researching. She's a fifth grade teacher who applied for the sabbatical to ETTC, she was the one who was chosen from _____ county, and because of our partnership with William Paterson that's how she came to us one day a week. So she's been... it's been super because she just simply the one semester she started again this semester, second semester, with four different teachers. So that's been beautiful. Plus they sent us a tech person, a boy in the college, who comes two half days a week to do any technical

problems like we want to set up printers or if something breaks down, and that's worked out really beautifully, because computer teachers really had to take care of all that, but because we're a small school, we have seventeen classrooms which include one special ed self-contained, she has a lot of slots open, so we use that for collaboration or if the office needs spreadsheets done or different reports done. But, next year she's going to become computer teacher slash technologist. So, she has enough time within her day we may not have, which is a sad thing, have the collaboratives as many as we've had, but she will be working, you know taking care of items like that. And, one other thing that I asked her to do for next semester, what we're doing now is we're working up a schedule where beginning February 1st, rather than working in her lab, she's going to do what this woman has been doing from ETTC. She's going to schedule going in to the classrooms and being there visibly to show the teachers how the computers can be utilized a lot more than they are, and that's where we need the help, you know the lab know they're comfortable there, they work on the computers, we have the LCD you know so there comfortable using that, some of the teachers are, but they don't see the connection in the room, you know they don't see that as another tool, so they're utilizing over-heads and other technology equipment, calculators and so on, but the computers are on but they're not utilized as much as they could be. So, what I' asked her to do is to work next semester in the class leave the lab open for teachers who would like to bring their class down, now that they're comfortable, can get down there and have their period down here instead of in the

class, and she would be more of a collaborator in the classroom and work it out that way, so we'll see. That's the future for us right now.

Q2. What do you do to advocate "best practices" in technology?

I guess some of it I've mentioned. I guess financial commitment. I could have utilized money in other ways, but I really feel it's the wave of the future, and it's going to be a part of their lives from toys to occupation, so I think commitment in that respect. My school management team has also supported that position.

Q3. What do you do to promote technology integration in curricular design and instruction?

Nothing

Q4. Describe the degree of assistance that you provide for teachers to utilize technology to access, analyze, and interpret student data.

We will in September go on what is called Star Base. So they'll be doing there... that's only grading that's not analysis, but they'll be doing that and the attendance, they'll be using it in that respect. Also, I don't know if I answered the question before, but I did allow my computer teacher to have an after-school program for teachers, something that should have come out of funds.

Q5. How often do you provide, design, or support technology-based professional development opportunities for your staff?

The school is in a whole school reform. So, we're in CO-NECT, the company that we deal with is CO-NECT, and their premise is... they're helping us to see how technology fits in to a project based learning. Through them, they provided a lot of training with the teachers. That hasn't been as successful as we'd like because

we're talking about thirty-five, forty people sitting in a room with one person trying to teach various selections, and somehow they've broken that down, and what they've done is they saw that that didn't work, you know this one shot training. They were fired up about it for a few days but then it just peters out, so what they're doing now is they're training two teachers, three teachers actually in technology. They're going to workshops and try to make them the master teacher so that they can turn-key to the staff, there's someone available on-site that could be referred to on a daily basis. So I think that's going to work a lot better. So we're just in the process of that right now. They're even suggesting that might be one way of handling other curricular areas as this master teacher is really like you set up a classroom teacher, but maybe one period a day or one day a week they would be the floater to go to teachers and sit with them or work in the classroom do a demo lesson, but be it first a master teacher math or language arts or you know. So that might be the road to the future here, because we do spend a lot of money on professional development, but it's like one shot, they go once they come back. But, if we can do it as a training process while going maybe four times at the various stages of the workshop and then turn-key and give us the master teacher, it might work. They're just opening our eyes to that right now.

Q6. What type of technology-based student record keeping system do you and/or teachers use?

Some of the teachers actually keep their records...you know actually have their own software and do their own record keeping rather than keeping a grade book,

which I allow. Teachers do their grades and plans using their own personal software which is fine with me, I'm hoping to encourage everyone doing that, and not that I'm so proficient at it I just see that as the way it's got to go.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

Q10. Are the staff's technological proficiencies, as measured against current technology standards, important to the assessment of instructional staff?

It's a part of it. It's interesting that you asked the question, because my intent next year is to see that that's a part of my observation, because there are times that I'm in there that there's no need for them or they just... it just hasn't been incorporated, but I really do want to see it utilized more. So, my problem is that the tech teacher, the computer teacher will spend this semester so that in September it's not such a frightening thing when I say that as part of the observation...

Q11. What type of word processing do you use and how do you use it?

I use word...

Q12. What type of database applications do you use and how do you use it?

Not Really.

Q13. What type of spreadsheet applications do you use and how do you use it?

Very Limited.

Q14. What type of e-mail do you use and how do you use it?

It's a district. I just have an e-mail address and I go to it.

Q15. What type of presentation applications do you use and how do you use it?

What the children are now doing in the fifth grade is they're creating the atoms, the ones on the periodic chart, so they're creating their own atoms so that they can actually see the makings of how atoms come together and create something... but you have something brand new and the teachers cause is doing that is the one using graphics, the newspaper person is proficient with the computer and the kids are really gaining tremendously because of her skills. So, aside from PowerPoint that's the one that...

Q20. How many students are using technology for basic skills acquisition?

I don't think we use that as much as we used to. We do have a basic skills program in the building, they do have basic skills software for those children, but as a practice we don't.

Q21. How many students are using technology to achieve higher-order thinking skills?

That's really what we're doing.

Q22. How many teachers design and implement technology-based learning experiences that promote higher level learning, and authentic assessment? How is this done?

They're exceptional, but because of this CO-NECT all of the teachers are really working with the computer on high-order thinking skills. That's CO-NECT, so all children do a lot of investigative analysis of different sites and research different sites and write a report and create presentations. They're all into all of that, and I have to say all the grades from the first grade on up...

Q23. What technology resources are available that support specific topics or lessons? How many teachers utilize these resources?

Again, because of CO-NECT, and because of the New Jersey State Department site, I think that's the extent of that response.

Q24. What is the availability and accessibility of technology that supports a variety of teacher and student experiences?

I think it's a hundred percent. It's available, as available as anyone would want.

Q25. How are technology resources being allocated?

I would say last year we spent close to a hundred thousand dollars on all aspects of technology. This year it hasn't been as lucrative, because of budget constraints, but last year we did. But by building, it wasn't because of the Abbott situation, it was just a commitment, and we just feel that we have enough people in the building who will utilize...it was worth the investment in other words.

Q26. What building level organizational structure exists that supports all aspects of technology?

Q27. What is the extent of community involvement regarding technology in your school?

It's not enough. I mean we've had some parents' workshops you know just a one shot deal not a series of classes which is what we would like to do. We would like to have the parent sitting with their child, you know seeing what the child can do to help them become more comfortable, because I think that would be helpful. We've talked about it but we haven't gotten into it, but as part of our action plan

for the next three years that's part of the plan that there will be workshops with parents and children.

Q28. How is technology used to align standards, curriculum, and assessment?

Q29. What percent of students have continuous access to technology in school? Yes, at all times. From early...all day. Anytime they want to utilize it. But don't forget to we do have them in the classroom, but the lab is used all the time. That's one thing...and there's a down side to that, the teachers sometimes don't see their classroom computer as being a place to go rather than down to the lab, but again what the computer teacher is currently doing is, she's having them put all their project work on floppys and we got all the teachers so the could go upstairs and put it in...and get the idea that this will transferable, because it's not compatible...I think the Mac is compatible with our system right now in the district where they can work on it in the lab and then bring it up in their room, it's one or the other I don't know. But they gave her a Mac you could work in the lab and then go to the classroom and continue with the project and the other way with the floppy they're going to be doing it, but it's been our conversation that they don't see the connection as well as we'd like. I'm hoping that the changes we make next semester will bring about that change.

Principal 8

Q1. What is your vision of technology and how do you foster a shared technology vision?

My vision of technology would be inclusion into the classroom directly related to the curriculum whereas students would do a project that requires that they use the

technology, but not the technology of...to show that they know how to use the computer. For example, if they were doing a PowerPoint presentation to go along with a social studies project, all the other information they have found through research would then be presented using the PowerPoint. That is what I would want the teachers to use, not just going into the computer lab and doing word processing typing the same thing they did in class.

Q2. What do you do to advocate best practices in technology?

We have a part time technology resource person and I work with her to go along with how I want technology to be used, so the teachers aren't spending time on how to use Microsoft Word, but she's working with them opening up the curriculum opening up the textbooks finding how their going to create these projects...developing rubrics, so I guess providing staff development, providing support.

Q3. What do you do to promote technology integration in curricular design and instruction?

The ones that I didn't mention is when I do observations I very often find something, find a way that they can integrate technology into that lesson. Even if the lesson went very well, you can always say, in the future it might be a great idea to pull up this web site and show it on the computer screen, show how kids whatever, or use it to create a hyper-studio, put that right into the written evaluation as a suggestion to try for next time.

Q4. Describe that degree of assistance that you provide for teachers to utilize technology to access, analyze, and interpret student data.

Q5. How often do you provide, design, or support technology-based professional development opportunities for your staff?

We have different training sessions before school at eight fifteen, so very often we'll have eight fifteen to eight forty five computer training. We have a computer... she's called a technology resource person... she's out on maternity leave as of last week... but she'll come by training weekly, and teachers go if they want, if they feel that it will help... and there are different levels, and teachers can use that toward their professional development hours, and that' new this year, and it sound great, but now she's out on maternity leave, but it also brought up to speed a lot of the teachers who missed out on it the first couple times around. The teachers feel comfortable with her; she's a former teacher here.

Q6 What type of technology-based student record keeping system do you and/or teachers use?

Strictly attendance.

Q7. What type of technology do you use to communicate with peers, experts, and educational stakeholders?

E-mail, fax machines.

Q8. How often do you provide opportunities for staff to share technology innovations with one another as staff development?

Probably not often enough.

Q9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?

Well, up until about a month ago we didn't have a technology coordinator, we went about eight months without a technology coordinator, so anytime something would happen in the computer lab, so if the computers were down in the computer lab it would mean trying to fix things; some kind of printing problem, how to view hyper-studio, use PowerPoint. They'd probably miss classroom, they'd call me. Since we have...at least we can do the work orders and the hardware end of fixing things.

Q10. Are the staff's technological proficiencies, as measured against current technology standards, important to the assessment of instructional staff?

I think that's pretty important. We're up to a point where next year I think I want to have it in the school goals that everyone has a web-quest or a tele-collaborative project, so you know I still have two teachers that I can think of off hand that don't know how to use word processing. So, they need to...I spoke to both of them this year...your professional days this year have to be going out and learning how to use the program. You can't worry about infusing it into your curriculum if you don't even know how to open a file. So I think it is important, and I think people around here have put it on the back-burner, because even our tech coordinator before...things never worked...everything was broken, everything was second-hand. So, they got so frustrated they didn't se it as a priority. So now we have a brand new lab, we just put it in last year, and things are working, now we have a tech coordinator, now it's like OK we can get going, but the people who thought we would never get going need to get up to speed.

Q11. What type of word processing do you use? How do you use it?

Primarily Microsoft Word.

Q12. What type of database applications do you use? How do you use it?

Access.

Q13. What type of spreadsheet applications do you use? How do you use it?

Excel.

Q14. What type e-mail do you use? How do you use it?

Q15. What type of presentation applications do you use? How do you use it?

Other than PowerPoint we use Hyper-studio, but it's a kids program. I don't really use it.

Q16. What type of desktop publications do you use? How do you use it?

No.

Q17. What type of world wide web navigation and search engines do you use? How do you use it?

Research, personal use, something I just started this month is talking to kids about their five favorite web sites to find out where they're going, what they're doing, what they're interested in. There are a few of our fifth graders that have their own personal web site. It's important to see what they're doing at home. There is this one kid who never talks to anybody and I asked him what his five favorite web sites are and boom he started talking to me. He owns his own individual web site.

Q18. What type of statistical applications do you use?

Not much.

Q19. What type of class scheduling applications do you use?

I used Max-school where I used to work, but at the elementary level I did the schedule by hand.

Q20. How many students are using technology for basic skills acquisition?

Primarily they would use something like that for math during recess.

Q21. How many students are using technology for to achieve higher-order thinking skills?

That would be as a class in the computer lab using the Hyper-studo.

Q22. How many teachers design and implement technology-based learning experiences that promote higher level learning, and authentic assessment? How is this done?

Maybe about five at most, about a quarter of them that really understand and go above and beyond with technology.

Q23. What technology resources are available that support specific topics or lessons? How many teachers utilize these resources?

No.

Q24. What is availability and accessibility of technology that supports a variety of teacher and student experiences?

We don't have a lot of curriculum based software. We have a primary word processing and another word processing, Hyper-studio and Kid Pics.

Q25. How are technology resources being allocated, e.g. staff development?

Probably hardware, cause like I said the guy who was the tech coordinator before everything was second hand and would rebuild and rebuild, so to get something new in a box is a novel idea here. But since he's been gone...he had a tight

control over who ordered what, and if you ordered things... even if I ordered ink for my cartridges he would intercept the order and wouldn't let me have it. The guy that came after him is much more open minded... he doesn't know what's going on in the school... he's not making educational decisions about what we're buying. We just say this is what we need and he tells us what we should get in order to meet our needs here, he should not go out and tell us what we're going to buy. So I budgeted for, knowing that our tech guy was gone in April... you know I know I needed printers for every classroom, twenty two homerooms and many of them couldn't print... that's a big chunk. So I went out and bought nineteen printers. I would budget for monitors, but everything is second hand. All the computers here are archaic and I had to beg for that when I started here. Right now we're looking at purchasing three-hundred new computers for the whole district under lease purchase using money from _____ _____, because everything is just broken.

Q26. What building level organizational structure exists that supports all aspects of technology?

Myself and the tech guy are about it. We're a small district, we're K to eight about a thousand kids, so anything that goes on here would go through me, and then I would work with the tech guy and the superintendent.

Q27. What is the extent of community involvement regarding technology in your school?

It depends. They had a networking day where all the parent ran all the wires several years ago. We have parent volunteers who run our web page; created it,

up-date it. In the computer lab itself I have two parent volunteers, two parents every period come in and help teacher, just input programs and help the kids. A lot of parent involvement over-all here. Parents even offered when the other tech guy left to run the technology department on a volunteer basis... but do to security issues... But when you need somebody to fix something you can't wait until there's a tremendous amount of work at six o'clock.

Q28. How is technology used to align standards, curriculum, and assessment? We have a new curriculum program that we just purchased Ed-Vision. Our curriculum is also a little bit out-dated. The last curriculum coordinator would just whatever the scope and sequence of the textbook would become the curriculum. So as textbooks were up-dated and resources were added it's not a curriculum any longer. So now we have this huge job in front of us to create a new curriculum essentially for every single area, we researched this company called Ed-Vision. It's a computer software program, you type in that you are New Jersey, so that you have the core content standards, you give the ESPA, you give the GEPA, you put whatever standardized tests that you give whatever objective....national standards and objectives. You put it all in and press return and it gives you a curriculum, but the problem is, since our standards are bench-marked at forth grade and eighth grade ninety percent of the curriculum falls at forth grade and eighth grade. So then you back into the computer program and you say OK this is the skill they have to match with forth grade, but technically it's introduced in kindergarten, it's reinforced in first grade, and it's mastered in second grade. So, you can manipulate everything and move it down. So we're

about four months into finishing our language arts curriculum. Revamping the entire curriculum, and it will be done by the end of this school year and on the Internet for parents to access. With the information given on the Internet, if teachers can go on and say I have to teach subtraction and fractions, not real sure hoe to do that, they go on to the web page with the curriculum, they click lesson ideas and it takes you to fifteen different web sites with lessons on how to teach that objective. So that's down the road, hopefully we'll have language arts done by the end of the year, but our curriculum committees meet forty five minutes twice a month, so the amount of work that we've done in a short amount of time, it would take us eight years to do that. And it was expensive. Three of us had to go out to San Diego to be trained how to use this program, but it was worth it because our curriculum needs complete revision.

Q29. What percent of students have continuous access to technology in school? Well all of them have computer lab twice a week where they go into the lab, there's twenty five computers in the lab. One hundred percent would have an hour and a half. And then there's one computer in each classroom.

The Conceptual Framework: The Organization of Research, Literature, and Data

The following section contains the conceptual framework of the preceding interviews. Although the framework for the interviews had been clearly established in the preceding chapters, the topics were broad enough and sufficient latitude had been given during the interview to allow for inductive analysis. The following organization will begin to establish the concepts drawn by the literature and the collected data, and further establish organizational "bins" to align the literature and data with the research questions (Miles & Huberman, 1994).

The concepts that emerged from the data collection had their origins in the literature and research discussed in previous chapters. Patton (1990) refers to the concepts that are introduces by the analyst, rather than the subject, as sensitizing concepts. Due to some of the common language of the principals, not found in the literature, indigenous concepts may be referred to. Patton (1990) defines indigenous concepts as terms that may be created by participants that capture the essence of the program.

Concepts

1. Vision of technology
2. Principal as Professional Development Provider
3. Principal as Professional Development Enabler
4. Principal as Professional Development Recipient
5. The Sharing of Information
6. Interpersonal Relationship

7. Technology Assessment of Instructional Staff

8. Technological Competencies of the Principal

8A. Modeling Technology Usage

9. Student and Teacher Engagement

10. Technology Integration

11. Integration of Classroom Technology

12. The Use of Technology in Curriculum

13. Availability and Accessibility of Technology

14. Community Involvement

Concept 1: The Shared Vision

Principal 1.

I guess primarily we certainly share with them our goals, our five year plan which is in place for technology.

> Senge (1990) states " shared vision is vital for the learning organization because it provides the focus and energy for learning. While adaptive learning is possible without vision, generative learning occurs only when people are striving to accomplish something that matters deeply to them. In fact, the whole idea of generative learning—'expanding your ability to create' –will seem abstract and meaningless until people become excited about some vision they truly want to accomplish" (p. 206).

"Associated with the vision has to be a plan, a way of reaching the goal" (Pejza, 1985, p. 10). Leithwood and Montgomery (1984) concluded that "goals are the long term aspirations held by principals for work in their schools. No other dimension of principal

behavior is more consistantly linked to school improvement by current empirical research than goals" (p. 23).

Principal 2.

We have a technology committee, that we formed, to come up with a technology plan...and we got a lot of insight from different people on different levels...so when they came in more people were ready to buy into it because we were all on this committee.

Westley and Mintzberg (1989), suggest that visionary leadership is dynamic and involves a three stage process:

1. an image of the desired future for the organization (vision) is
2. communication (shared) which serves to
3. "empower those followers so that they can enact the vision" (p. 18).

...but we had a big vision, and she didn't feel comfortable with our big vision. So we interviewed a lot of people, and what we did was we went with someone who we thought was a people person that could draw other people in, because at that point we didn't have much technology, and what we had other staff members were afraid of.

Principal 3.

The district we're part of, family network communication, the whole district is involved. Every school has a web-site, and I have a web-site master assigned to my school. So, all my staff...and we put everything on it, principals, messages, PTA messages, school announcements go in there, monthly calendars.

Principal 4.

The entire school vision is created by the staff, so if technology is going to be the part of any school it would have to come from the administration and the teachers...whether

or not it's sharing or whether it's using it we do use the computer a lot as far as correspondence and what we do is through that use that becomes a part of the daily life of the teachers and the school, so it's just by example and by just becoming incorporated into the daily life that it becomes part of the vision.

School administrators that have developed a shared vision with their faculty have also created a common ground that serves to facilitate or compel action to the realization of this common vision. Frequently underlying a shared vision are teachers' and administrators' shared values and beliefs, specifically believing that schools are for students' learning (Southwest Educational Development Laboratory, 2001).

Principal 5.

So I'm looking for vision wise is to incorporate it as part of the learning environment to use it as a resource, as a way to teach integrated with the learning process. It's just part of our lives, especially children's lives.

The technologies themselves that so many of them advocate best practices just has to be a commitment from top down and throughout...it's got to be support, it's got to be staff development, it's got to be continuous. You need people to support it and you need them to believe in it, but it all comes from the leader of the building,

The superintendent that used to be here in _____ is really a visionary in technology his name is _____, he really brought the vision to _____, and I sort of went along with it and it works really well here because we're so committed to it.
I really believe that I'm still committed, that the program works because of the commitment. If I wasn't committed to, it would just phase out, like everything else, it would fizzle out, you would get your super-stars that would use it regardless, and it

would just sort of fizzle out. This way with the commitment it might not be...everybody might not reach that high level, but everybody uses it, and everybody has certain expectations to become proficient and keep on trying, and keep on becoming better and more proficient in using the technology.

Commitment is the complete responsibility for the vision and whatever actions are necessary to see it to fruition (Senge, 1990).

Outstanding principals go beyond merely involving teachers in decision making—they encourage teachers to continuously engage in identifying best practices (Senge, 1990; Watkins & Marsick, 1993).

Studies on technology integration in schools conducted by Marco International indicate that effective leadership is essential to the integration of technology (Livesay & Murray, 1992). The impetus for a technology initiative is often a visionary superintendent or school principal. It is that person who will lead the development of a shared vision for school improvement.

Principal 6.

...to network all the classrooms in the school together, to network the two schools together, and to network...we have three sites; board office, two schools. So that we should all be networked together, we should all be able to communicate with each other...

...every classroom should be connected to the Internet. Every classroom should have a computer in it that allows children to do real-time research. Upper-grade classrooms should have four to five computers in them that allows the teacher to use the concepts of Learner Active and use the small group process and the research children can

do through the Internet to...and use the technology to its fullest, and there should be a centralized either library or computer room where the whole class can come and that computer room should or library, I'm not sure which I prefer, should have enough computers for...so each child can work on a computer so an entire class project can be done...

My vision would be that the computer would be a seamless tool used in the classroom to aid instruction. Not an end all, be all, not something to teach typing on, but a research tool. I think you have to use the technology as a tool, but it's not the only tool.

> "Transformational technology leaders are creators of future visions and laborers in everyday realities. They emphasize their strengths and minimize their weaknesses. They empower others as well as themselves and thereby transform organizations. They live the questions and paradoxes of leadership in a burgeoning age of technology. They build the field, break the mold, and create new educational models" (Bergeron, 2001, p. 1).

According to Blumberg and Greenfield (1986), whatever the vision was, it went well beyond the status quo. The vision is a personal commitment that distinguishes them from other administrators, and as vital to the success of the students and teachers in their school.

Principal 7.

I guess financial commitment. I could have utilized money in other ways, but I really feel it's the wave of the future, and it's going to be a part of their lives from toys to occupation, so I think commitment in that respect. My school management team has also supported that position.

Mergendollar (1994) suggests that the role of the principal is essential in school technology use. Also, for technology to become used across a district, leadership by the central administration, especially the superintendent, is critical. These findings are supported by the organizational change research, which has consistently found that change efforts do not succeed without active administrative leadership, particularly by principals. Research has shown that leaders perform four important tasks: (a) obtaining resources, (b) buffering the project from outside interference, (c) encouraging staff, and (d) adapting standard operating procedures to the project.

Principal 8.

My vision of technology would be inclusion into the classroom directly related to the curriculum whereas students would do a project that requires that they use the technology, but not they technology of...to show that they know how to use the computer.

Blumberg and Greenfield (1986) identify three specific factors that contribute to principal success: (1) desiring and eager to make their schools over in their image; (2) proactive and quick to assume the initiative; and (3) resourceful in being able to structure their roles and the demands on their time in a manner that permitted them to pursue what might be termed their personal objectives as principals. Blumberg and Greenfield (1986) refer to the first factor as principal vision. Although each one of the principals interviewed had definite ideas about what their schools should be like, specifics about vision varied from principal to principal.

Concept 2:The Principal as Professional Development Provider

Principal 1

The plan is to continue to upgrade...people are always going out getting set up where they go to the New Jersey Texpo and that's been going on for about the past four years, and they come away with some great ideas from that.

Principal 2

So the emphasis is on staff development, to make sure the staff is involved, they have to go to class, they have to go to class once a week with their students, so they're learning along with their students. What we've done with the teachers beyond that, that don't need that (training), we give them other things to do, like other activities that they can do on the computer.

We also provide professional development right here with our consultant, our teacher consultant, and we have provided on-going...technology...

Regarding The Culture of the School and Professional Development, Fullan (1995) suggests that professional development is limited due to experiences seen as separated events. Research on collaborative school cultures shows clearly that learning is built-in to the day to day interactions among staff who are concerned and dedicated to learning as a life-long event.

Principal 3.

Our supervisor of technology...sponsors many workshops for the teachers...So I encourage all our teachers to participate in these programs...

Principal 4.

There are six or seven minimum state standards that all teachers...all professional staff, not just teachers must show proficiency by the end of their year. Whether or not it's each year or whether it's the first year, and tech coordinator, what we do together is, each teacher, on a personal basis, we sit down and we decide where that teacher is as far as the different requirements and how we can provide courses.

I never do it as a school because there's no place here to provide that for thirty, forty, fifty people...

Principals are ultimately responsible for determining the appropriate type of technology training for the school staff (Dyrli, 1996).

Eisner (1995) suggests that the public schools are better equipped to provide professional development; teachers know what teachers need. Teachers may know what they need, but a wider perspective is preferable. However, the universities can only accommodate a limited number of partnership schools.

In order to better prepare teachers to assist students' achievement of the Core Curriculum Content Standards, administrators and community leaders must be aware and supportive of the professional development activities essential to this goal (CEO Forum on Education and Technology, 1999).

Principal 5.

It's on-going actually we do a couple of really neat things in the building. I will regularly have support groups and technology training that I will conduct after school every couple of weeks, once a month, through faculty meetings. It goes on throughout the day, but we also in this building have a unique piece in the schedule, it's called the

professional development period, where all of our teachers are off in different periods. There are six periods where every staff member meets as a group and what we've basically done is conducted a professional development class through that period of the day. So we in-service our own technology... We do research in the professional development period. How do we get the research? We do it via the Internet.

...though it really comes from myself [staff development] , it comes from the staff, what I feel they need...

Principal 7.

...but I did allow my computer teacher to have an after-school program for teachers, something that should have come out of funds.

Principal 8.

We have different training sessions before school at eight fifteen, so very often we'll have eight fifteen to eight forty-five computer training...but she'll come by training weekly, and teachers go if they want, if they feel that it will help...and there are different levels, and teachers can use that toward their professional development hours, and that's new this year, and it sound great, but now she's out on maternity leave, but it also brought up to speed a lot of the teachers who missed out on it the first couple times around.

Dyrli (1996) suggests that successful professional development can be achieved by utilizing a number of key elements including: offering a variety of options, emphasizing skill development, providing hands on experiences, tailoring programs to local realities, using genuine teaching examples, and providing supporting materials.

Concept 3: The Principal as Professional Development Enabler

Principal 2.

We were part of a grant from ETTC for Warren County College and Vo-Tech School, and we were able to send our teachers over there, and our teachers can take part in whatever professional development they're offering... Whatever teacher wants to go, we let them go.

Under the right conditions, such as some workshop settings, training-based staff development approaches can be useful in delivering to teachers certain types of information about teaching techniques or technology use. Well designed workshops and courses which offer depth and focus, provide adequate opportunities for practice, involve doing real work, provide opportunities for consultation, and make possible follow-up classroom consultation, can be effective in imparting new skills to teachers (Little, 1993).

Principal 3.

If we have the money, if they want to go, they go, it's as simple as that. We get a budget for professional days... the supervisor gets me lots of extra money from Eisenhower Grants, so I encourage the staff to go... I don't have enough money to send everyone, so I try to rotate around...

If I have the money, if there's a workshop or something that's technology related they want to go to it... you know if they haven't gone to something else before if they've gone to a conference ahead of time I'll say "you should know I really can't pay for you". "If you want to go, you can go, if you want to pay for it yourself, I don't have a problem." If they're interested they'll go.

On professional development Kalmon (1999) states "Teachers are for the most part, still expected to learn on their own time, away from the work context in which the new knowledge needs to be applied. The primary modality continues to be the workshop, a class, or a series of three or four classes, that lasts for a few hours and then is usually heard no more. These isolated learning strategies rarely have any lasting impact—other than to make teachers cynical about in-service learning. They have not been proven to be effective methods for helping teachers learn to use and apply technology tools" (p. 1.).

Principal 6.

We run a professional development academy. The school district runs one. It consists of two days where the children are not here but the teachers are, as well as a series of after-school programs... Some of these or a portion of these are computer; doing a web page, using Internet as part of your technology...as part of your classroom, things like that.

Concept 4: The Principal as Professional Development Recipient

Principal 1.

"...right now I'm going through New Jersey ELITE. In terms of visiting various web sites and e-mailing and things like that I'm fine. I never was much of you know in terms of doing a word processor or just doing some creative stuff...I'm learning how to get to that point. I need to just devote that time to doing that.

"Nation-wide preparation is not meeting the needs of the school administrators in the area of computer technology and information management" (Crouse, 1994).

Principal 4.

Access, that's the one I'm actually looking for courses in...that could be very...that's like a real database program where you can really integrate a lot of different things.

Principal 5.

I took part in a really nice workshop this summer called new Jersey ELITE, NJ ELITE, it was a Bill Gates grant, a five point one million dollar grant to train superintendents, principals, and administrators in New Jersey in technology. The main focus for me, or the main plus of the workshop...it was a four day workshop, was the networking piece. The networking piece seeing what other districts do, how they work, what technologies they use, and that connecting was a very good piece. The actual technology didn't really...wasn't mind-boggling, it was just...The support, they gave out excellent resources and materials that we could use. This is a phenomenal resource bank of anything from software to web sites to anything you could imagine. So, making the connections with people, networking with people, seeing how it's done in other districts, is the way that we would try to support it and implement it.

As a VP I was able to, in the last three or four years really get involved with SASSI, and get involved with the administrative technology coming in to the district, and I've gone out to Reading where they do the training and have really become an expert in the system, and through SASSI an off-shoot of it is INTEGRADE PRO, through that SASSI also another off-shoot is PAIR Connect, and it really effect the whole entire school and the district, it's really a very powerful tool.

Principal 8.

Three of us had to go out to San Diego to be trained how to use this program [Ed-Vision], but it was worth it because our curriculum needs complete revision.

Concept 5: The Sharing of Information

Principal 1.

I'm one of the panelists, coordinators, for New Jersey best practices. On the whole it doesn't just carry through for technology, but we had done something like this for language arts a couple years ago where we had a half a day devoted to the sharing of best practices among the sending districts...

Principal 2.

I try to use my meeting as professional development, and we do a lot of turnkey, so if someone has done something that's really working well, they present it at a faculty meeting to the other staff members.

Principal 3.

The teachers will find stuff on their own, and they'll turnkey it at any staff meeting monthly where we open discussion at the end...but it's not a routine thing it's sort of like sporadic.

Principal 4.

Formally, we have grade level meetings, and that happens once a month, and what teachers are invited to do, not just for technology, but technology's one of the areas, is they come and talk about it like...what we call it is like the "one feather". It's the one thing they're proud they did this month, just to get those good ideas going around.

Principal 5.

So we think that the sharing piece is really important, so we want people to teach each other, we want our teachers to teach each other, we want the kids to teach us what we're doing. We do want to share, sharing is so important, and it's not only sharing it's getting those people to use it.

One of the most valued sources of information is contact with those individuals who have already experienced the innovation. Teachers who use technology are often the best sources for teachers who have yet to adopt it (Rodgers, 1983).

Principal 7.

...we're part of the William Paterson Partnership Grant, and they had given us twenty thousand dollars over the summer for summer programs, we turn-keyed in September to all the practicum, the student teachers that came into our town which we did, and then they gave us additional funds to buy computers...

Through [CO-NECT] them, they provided a lot of training with the teachers. That hasn't been as successful as we'd like because we're talking about thirty-five, forty people sitting in a room with one person trying to teach various selections, and somehow they've broken that down, and what they've done is they saw that that didn't work, you know this one shot training. They were fired up about it for a few days but then it just peters out, so what they're doing now is they're training two teachers, three teachers actually in technology. They're going to workshops and try to make them the master teacher so that they can turn-key to the staff, there's someone available on-site that could be referred to on a daily basis.

...we do spend a lot of money on professional development, but it's like one shot, they go once they come back. But, if we can do it as a training process while going maybe four times at the various stages of the workshop and then turn-key and give us the master teacher, it might work.

> Nias, Southworth, and Campbell (1992) studied five primary schools in England. The themes they discuss confirm as well as shed additional light on the key factors related to continuous improvement. "Four themes stand out in the investigation of Nias and colleagues: (1) the central importance of teachers' learning, individually and in relation to colleagues; (2) how changes in teachers' beliefs and practices toward sharing evolve over time and how independence and interdependence coexist in dynamic tension; that is, conflict is normal; (3) how working conditions for continuous learning and continuous development of a whole-school curriculum inhibit or facilitate the process; and (4) the inevitability of complexity, unpredictability, and constant shifts both within the school and in the external policy environment" (p. 258).

Concept 6: The Relationship of the Technology Coordinator to the Principal and Instructional Staff

Principal 2.

...we went with someone who we thought was a people person that could draw other people in, because at that point we didn't have much technology, and what we had other staff members were afraid of...there were other people that I interviewed that had wonderful technology skills that were far above the person we hired, but the people skills

were awful, and my feeling was I don't care how good those skills were if you don't have people skills, and you can't get my staff involved, we're not going anyplace.

...organizational support, questions the structure that exists for the support of all aspects of technology integration, transformational leadership, policies that support the equitable availability and use of technology, effective and ongoing staff development, and the use of technology as a management tool (SEIR*TEC, 2000).

Principal 3.

...we have two technicians in the district that service all the buildings...If there's a problem they call down from the library and say the printer isn't working, I just call [the technician's] office and in a matter of minutes one of the technicians is here and fixes it up, so which is kind of nice.

Principal 5.

We have one guy basically that runs the networks and supports the technology for six schools, and I'm lucky because he sees that it works here, so he likes hanging out here and he doesn't get bombarded when he walks in the door here because I troubleshoot a lot of the problems myself, so he's able to become effective and he sees the technology works here so he's here to help us out.

Principal 6.

We had a technology maven here...and that person was in charge of our technology. We have very little, the principals, to say about it. As a matter of fact when I started, I was probably most concerned with the fact that I had very little to say, nor could I get any kind of input as to what was happening with the technology.

The computers here...everything was taken off the computers and he wouldn't load any software. It was a nightmare...I could not get to the control panel in my laptop. I was locked out of the control panel. And I said I want to get to the control panel...I wasn't...we finally referred to him as the computer nazi.

The new tech guy is a software...he's not a hardware person, he's a software person. So he's putting the software on for the teachers and also try to teach the teachers how to do this other thing. He's established a web page for the district, so we're moving along.

The computer nazi would determine what search engines we would use. I can tell you that they would not, they would not, would not, would not give me access to my e-mail account. I could not determine what password I wanted. Somebody else determined what my password would be. I have an e-mail address. I use my e-mail address for professional interactions that I have. I have a business card that I give out and they didn't want me to use my e-mail address, they wanted to give me one. It's changing slowly, but it was pretty miserable for a while. It didn't change, by the way, until he pulled the same thing with the new business administrator and the new business administrator said what are you crazy, I need access to my control panel.

Right now...well when we had the computer nazi, he determined [resource allocation] it. Now we have a new guy who also seems to be determining it, but I'm hoping in this budget process that principals have a little more input.

Modern managers recognize the importance of building relationships in organizations, however Wheatley (1994) suggests that inter-relational managerial techniques uncover a host of relationship-based problems. "How do we get people to

work well together? How do we honor and benefit from diversity? How do we get teams working together quickly and efficiently? How do we resolve conflicts? These relationships are confusing and hard to manage..."(Wheatley, 1994, p. 144).

Interpersonal leadership is the initial stage in creating a shift away from the school leader..."instead of worrying constantly about setting the direction and then engaging teachers and others in a successful march, the 'leader' can focus more on removing obstacles..." (Sergiovanni, 1992, p. 43).

Principal 8.

...the guy who was the tech coordinator before everything was second hand and would rebuild and rebuild, so to get something new in a box is a novel idea here. But since he's been gone...he had a tight control over who ordered what, and if you ordered things...even if I ordered ink for my cartridges he would intercept the order and wouldn't let me have it. The guy that came after him is much more open minded...he doesn't know what's going on in the school...he's not making educational decisions about what we're buying. We just say this is what we need and he tells us what we should get in order to meet our needs here, he should not go out and tell us what we're going to buy.

The personal strengths of school principals are important to leadership in traditional literature, however more rigorous models of leadership indicate the essential aspects of interrelationships between distributed participants (Schultz, 2000).

Concept 7: Technology Assessment of Instructional Staff

Principal 1.

This was the last of the joint efforts, and by that I mean I had representatives on the committee from the four sending districts, and this is what we decided to come up

with. One of our tasks, and I think this is a challenge for all administrators, is that we really need to evaluate its (technology) effectiveness, and we don't do that, enough of that, and its like anything else I don't want to say we don't have enough time...we have to find the time to really evaluate, to see how effective the new curriculum is in the respective areas. So we hope to really get input from staff along those lines.

Principal 2.

That is something I look for in the classroom when I go do an observation. What is being used? Is the computer being used as a tool? How are teachers using it?

Present teacher evaluation instruments are not well suited for assisting teachers with the integration of technology in the classroom. Such evaluations typically contain general requirements or a checklist of items. Tools that may be more beneficial are self-assessments of teacher technology skills and open ended classroom observation protocols (Byron & Bingham, 2001).

Principal 3.

...when I observe my teachers, I try to have them demonstrate to me that they are doing...incorporating technology into all the areas, as much as they can.

To realize high standards, teachers and educators need to change traditional methods of instruction and the passive means by which students traditionally receive information. More effective methods of instruction are based on engaging students in complex problem-solving activities whereby current technologies are used to deliver vastly greater informational resources into the classroom than prior, or non-technological resources were able to (Hawkins, Spielvogel, & Panush, 1998).

Principal 4.

...look for it in the lessons, they submit lesson plans for review and I look for the technology use in their lesson plans, and secondly when your doing observations you specifically look for the technology used in the lesson...

Principal 5.

Before I get to the educational piece, just something we did discipline wise, it [SASSI] actually has a whole discipline component, we address and we interpret the data on classroom management that way...see where our weaknesses lie, what events are re-occurring throughout the building and how to address it. If we target those people, tell them how to become better classroom managers, then that in turn they'll become better teachers and then in turn the students will become better learners.

This New Jersey ELITE program that I just told you about has an extensive technology survey involved with it. What I did is that we set up an account for the entire staff to take a technology survey. What was great is that all you did was enter their e-mail and they would send the staff reminders that they had to finish their survey, so we got the whole staff to do it, one hundred percent, and they in turn are sending us a report analyzing our strengths and our weaknesses, where we need improvement, where we need to grow, and in turn that will improve instruction, and that will in turn improve student learning...

...so I just want them to see that it can be used as a tool to make the class more exciting to improve student learning, to make the classroom better. So, I don't base my [assessment] criteria, I don't evaluate how good somebody is technology wise...

So again I don't use it in the criteria to evaluate staff, but I encourage them and I support them and I push them to use it as a way to increase student learning.

When I have to make decisions that are based on the school and our achievements then I'll use it [The Electronic Grade Book], but I don't use it as much as I could, but I'm familiar with it and a lot of people are not familiar with the power that exists behind statistical analysis.

> "Research on teaching and learning in technology-rich environments and SEIR*TEC members' experiences in technology-poor schools support the notion that educators go through incremental stages on their way to becoming technology proficient (Dwyer et al, 1991; Apple Computer, Inc., 1995; Lemke and Coughlin, 1998). Research and experience also indicate that teachers and administrators need support from school and district leaders as they go through the stages. As teachers try new strategies and adopt new technologies, they are bound to stumble; it is up to the principal to assure them that it is okay to be less than graceful as they are learning" (Byron & Bingham 2001, pp. 4-5).

Principal 6.

I really don't (assess technological proficiencies). A lot of them use it, but because of the technology problems that we had, I couldn't. On any given day the Internet's not working. We have hardware problems that are not solved. We have a server that doesn't have enough ports to support all the computers that exist on any given day, particularly in this building, Internet access could be down. So if I say to teachers, when I come to watch your lesson I want to see technology, well on that particular day it might not be possible... So I really don't think, I see it used, it's used quite often

particularly in the upper grades, but I don't see that it plays any role yet in my evaluation of staff.

The perspective of educational leaders indicates that under-utilization of technology in the classroom results from the following: inadequate teacher training; a lack of vision of technology's potential for improving teaching and learning; a lack of time to experiment; and inadequate technical support (OTA, 1995).

Principal 7.

It's a part of it. It's interesting that you asked the question, because my intent next year is to see that that's a part of my observation, because there are times that I'm in there that there's no need for them or they just...it just hasn't been incorporated, but I really do want to see it utilized more. So, my problem is that the tech teacher, the computer teacher will spend this semester so that in September it's not such a frightening thing when I say that as part of the observation...

Exemplary teachers use computers in lab settings as well as classroom settings at the school for consequential activities that is where computers are used to accomplish authentic tasks rather than busywork such as worksheets, homework assignments, quizzes or tests (Heinecke, Blasi, Milman, Washington, 1999).

Principal 8.

I think it's pretty important. We're up to a point where next year I think I want to have it in the school goals that everyone has a web-quest or a tele-collaborative project, so you know I still have two teachers that I can think of off-hand that don't know how to use word processing. So they need to...I spoke to both of them this year...your professional days this year have to be going out and learning how to use the program.

You can't worry about infusing it into your curriculum if you don't even know how to open a file.

Concept 8: The Technological Competencies of the Principal

Principal 1.

I've played around with EXCEL...E-mail, every day...I'm learning about PowerPoint...World wide web navigation, every day...Class scheduling, with the technology coordinator.

Principal 2.

In fact I did a lot of the technology stuff before this person came in, and my expertise level isn't that good, but at that point I was better than anyone else here...
I do all my lesson plans, reviews, are all e-mailed to the teachers...when I send notices about faculty meetings it's e-mailed, so they have to look at they're e-mail. We have a daily bulletin that's e-mailed to all the teachers...
Record keeping...for the attendance records...I use mostly Word...I use the Excel for spreadsheets...I really enjoy using the PowerPoint...We have Netscape Communicator.

I'm trying to use more technology. I'm forcing myself to use it more and more.

Scarpa (1998) indicates that technology competencies vary in their level of importance. Vision, staff development, and communication skills are essential competencies, while integration into organizational culture, support, and adequate funding are very important. Leadership practices are very important for educational administrators who implement technology in their organizations, however a low level of technology competency may not be critical to the technology change process. The

competencies deemed not essential to administrative effectiveness in technology implementation are software, hardware, and terminology.

Principal 3.

I use Microsoft Word...I have my own web-sites...my own search engines

Principal 4.

The major form of technology that I would use [for communication] is basically e-mail. I mean we send each other documents, messages, articles...Record keeping...UNIX...I use word...I use Excel if I'm going to do some kind of mail merge...The spreadsheets as far as making a spreadsheet and getting some very simple formulas...

...the district actually really tries to push you to make presentations via the computer. So whether it's the PowerPoint, whether your using the LCD projections, on the machine, whether it's simply just having the PowerPoint printout...
I use the Internet...to research anything I have to present to them.

Technology Enriched Administrators, a document made available by the Virginia Department of Education, recommends the following for the role of technology in administration:

1. Collecting, Organizing, and Analyzing Data
2. Using Data to Make Informed Decisions
3. Using Programs to Allow for Efficient Data Collection and Communication
4. Using Technology to Enhance Communication with Students , Teachers, Parents, Community Members, and Officials
5. Using Programs that Facilitate Scheduling

6. Understanding the State Department Role

(Virginia Department of Education, 2000)

Principal 5.

What I've found is that I'm one of very few who know how to use the program to its capacity, cause it changes regularly and up-dates regularly. You have to use it and I do use it...it's not a secretarial tool it's really a good teaching administrative tool.

I type all my letters, I do all of my memos, I don't use an office manager as much or secretary...end up doing most of it, a lot of it myself.

The main component is called SASI. As a VP I was able to, in the last three or four years really get involved with SASI, and get involved with the administrative technology coming in to the district... and through SASSI an off-shoot of it is INTEGRADE PRO, through that SASI also another off-shoot is PAIR Connect, and it really effect the whole entire school and the district, it's really a very powerful tool.
What I've found is that I'm one of very few who know how to use the program to its capacity, cause it changes regularly and up-dates regularly. You have to use it and I do use it...it's not a secretarial tool it's really a good teaching administrative tool.
I do all the scheduling through the program, I do all the grades setup myself, I do all the module order and securities setups myself, so I'm indebted in using the technology daily.
Database applications, we use EXCEL extensively...

...SASSI, one of the great things with SASSI is it exports data, imports data, it bring things in and out, it's one of the better technologies that I've ever used.

The spreadsheet I do believe is similar to the EXCEL program. I use Microsoft Office applications. I've become proficient...I don't know if this is the next question but

I use PowerPoint as a way to present to the community, and the staff, and the children. We do imbed it into our curriculum, our students do use it. I use it to present. The perception of the technology, the basic PowerPoint presentation, your perceived as very high knowledgeable, and it's just really a very simple Office application.

...we did a piece on digital camera...importing it into PowerPoint...

We do research in the professional development period.

I use Microsoft publisher, I use Print Shop, anything that comes around I like to press the buttons and then you learn...

I told you about the Palm, I should have been using the Palm five years ago with my proficiency but I just never did it, just wasn't something that I was doing then, now it is and that's O.K.

Yeah statistical applications, this electronic grade book is one of the neatest things I've ever used in my life. Let me show it to you. I want to show you how the statistical analysis can be used. This is a record of every grade that a teacher has and their classes. This program is so powerful as far as statistical analysis and is so under-used that if you look at the statistical analysis of this program it does anything from stanines to T squares to quartile ranks, it's an incredible tool. You can then graph student performance, compare tasks, correlations, compare tests, compare what works in one class compared to another class...incredibly powerful stuff...scattergrams, correlations, it's a powerhouse statistic-wise.

There is a link between an administrator's ability to make informed decisions about school technology and their personal use of technology, however there is a small

percentage of administrators who are becoming more technologically literate (Trotter, 1997).

The CEO Forum on Education and Technology (2001) states that administrators can respond to the demands of various constituencies through the effective use of technology, and demonstrate:

1. improved ability to make data driven decisions
2. improved ability to meet student needs
3. improved ability to define student objectives and measure performance against them
4. improved ability to manage school business practices
5. improved communication with key constituencies

Principal 6.

I use the computer program I have to do a newsletter every month...incorporating pictures that I take with the digital camera into the newsletter. So, I'm pretty versed in using that...the computer as a tool to create hard copy that I send out.

I've really up-graded what the newsletter looks like. I guess that's my biggest claim to fame. Let me say this, digital camera existed in this building nobody used it till I got here. We have a projection video and PowerPoint, nobody used it till I got here. I'm pretty conversant with PowerPoint and I use PowerPoint in my presentations in my work with the professional development academy and the courses that I teach. I use it for faculty meetings. So I use it for training, staff training and development.

I use Microsoft Word. I use it for everything. The secretaries type half what they used to type because I do it. It's easier for me to phrase on the computer.

I use some e-mail...I use that [PowerPoint] extensively...Publisher. Microsoft Publisher.

Principals of technology-rich schools feel strongly about the use of skills in word processing, electronic mail, World Wide Web navigation, World Wide Web search, spreadsheet, and presentation. Principals of technology-rich schools feel less strongly about the skills or use of desktop video tools and statistical software (Peterson, 2000).

Principal 7.

I use word...I just have an e-mail address and I go to it.

Principal 8.

...so if the computers were down in the lab it would mean trying to fix things; some kind of printing problem, how to view hyper-studio, use PowerPoint. They'd probably miss classroom, they'd call me since we have...at least we can do the work orders and the hardware end of fixing things...Record keeping...Strictly attendance. Microsoft Word...Database...Access...Spreadsheet...Excel...E-mail... PowerPoint...Search Engines for research, personal use...Class sheduling...Max-School.

"School principals' roles and responsibilities are very complex and vary widely; for today's schools, they include technology-related knowledge. In general principals find technology skills extremely important, but at the very least, they must have an understanding of how technology fits into the school environment" (Peterson, 2000 p.66).

Concept 8A: Modeling Technology Usage

Principal 3.

All my reports to the superintendent, my monthly reports which has like I said student data, test scores when they come in I have to compare. My ESPA scores from

several years ago to this one here, look at my general population, my special ed population, my bi-lingual population see how their test scores are doing from year to year. I analyze that, and one of our building objectives is improving ESPA scores so I have to prepare that in my end year report that we have to turn in to the board of education meeting. So, everything is done with computers, everything.

Concept 9: Student and Teacher Engagement

Principal 1.

That I'm going to say is a god number because certainly that's been one of our thrusts to promote those higher-order thinking skills, and I'd like to think that's going on throughout the day, so we have 262 kids and would hope to some degree that's being done.

Our school was sited as...in Ninety- Nine, two years ago we had a...we were at the Northeast Educational Computing Conference...that was in June in Atlantic City, last year it might have been in Atlanta.

Principal 2.

Our new math program came with software, CD's, and started with the coordinator would do that in her class and eventually got so that the teachers could do it in their class, and they would do a lot of the higher-level learning skills that do apply the math for problem solving.

I would say I have about twenty percent of the people are good at it (technology designed learning), that are really into it, and those are our core people that we use to tie in the rest of the people.

A publishing company comes here, they invite senior citizens, they work with the sixth grade students and they write a book together. The sixth graders interview the senior citizens and they do that in December, and they present them the book in Hyper – Studio presentation in May.

Becker, Ravitz, and Wong (1999) report that along with several other groups of teachers, elementary teachers are more apt to use computers with their students on a regular basis. However, more elementary teachers frequently make use of game and drill software. Generally, 50% of teachers' students use word processing, 36% use CD-ROM reference software, and 30% of all teachers have students use the World Wide Web. The most used programs and software title mentioned by teachers are: Microsoft Works, Netscape, Accelerated Reader, Hyperstudio, and Geometer's Sketchpad.

Principal 3.

I think my staff is very literate with computers. I don't think I have a staff member here that doesn't go on e-mail, that doesn't have Internet access, that' not pulling things off the Internet, using it. I mean the complaint I get is they wished they had more computers in their classrooms...

Probably every kid in the school (uses technology for basic skills acquisition).

...grades three through five (use technology for higher-order thinking skills). Because they have computers in the classroom, they have more time in the lab...

Every teacher in this school does something on the computer, be it lesson plans, special projects, creating things, designing different projects or activities...

...an art teacher had a half year sabbatical last year...to study all computer generated art. She's really into the art and computer generated, so she's incorporated a lot of art into her curriculum on computers.

Hopson, Austin, Simms, and Knezek (2002) suggest that the creation of technology-enriched classroom has a positive effect on students acquiring higher-order thinking skills.

Higher proportions of teachers use computers on a regular basis who have even small numbers of computers in their classrooms. The computer in the classroom seems to be a more valuable tool to find, analyze, and communicate information even when the teacher has access to the computer lab with considerably more computers (Becker, Ravitz, & Wong, 1999).

Principal 4.

...but the students...that's something they really...you give them a topic to look up in the library, and then give them the same topic to look up on the Internet, they will do...they're so much more focused using the Internet than going to the library. So, it.s almost a given that if you want to get them engaged, just give them a focal point, just look this up on the computer. It really is, it's classroom management almost.
For basic skills right now, the students use that in the after-school program. And then during the day, within a given week every child is on a____basic skills language arts, basic skills writing or math, they do go on the computer for that. And then during the day, within a given week every child is on a basic skills language arts, basic skills writing or math, they do on the computer for that.

> A shift in instruction occurs from teacher-directed to student-oriented learning when technology is employed (SEIR*TEC, 2000). "Exploratory technology combines some content with a particular delivery strategy to encourage students to explore a subject and construct their own knowledge. The majority of exploratory technology applications are open-ended and can produce a variety of narrative outcomes. The primary goal when using an exploratory technology is not to get the right answer but rather to use the technology to engage with a subject and derive meaning from that engagement" (p. 68).

Principal 5.

So we're using this technology as a staff, and once we're comfortable as a staff, so then the rest will come down to the kids. That I think is the biggest boundary that we face in education, is getting the staff comfortable with the technologies...it's not their world...it's not their paradigm necessarily.

I would say...seventy five percent (of our students are using technology to achieve higher-order thinking skills). I'll say between thirty and forty percent (of our teachers design technology-based learning experiences).

And then, what I try to do is promote leaders from within, teachers that do well in technology and are proficient, and I want them to help and support it at the building level.

> The CEO Forum on Education and Technology (2001) recommends that both federal and state policy provide for basic technology literacy for all students. "We must also ensure that our children have the ability to move beyond basic skills to apply higher order problem-solving skills that will be needed to compete in the new and ever changing information economy. Students must be able to use

technology's tools to enhance learning; increase productivity; promote creativity; research topics online; proficiently use web-based tools; evaluate sources; develop problem solving strategies; and incorporate technology into their coursework" (p. 6).

Principal 6.

I can tell you the teachers here are very, very well versed in the use of technology. They're very well versed. They're ready to roll. We need to provide them the hardware to let them do it.

...for years and years and years these people were trained in Learner Active which includes the use of computers, so they're very computer knowledgeable. That' been happening over the last I would say ten to twelve years. So the teachers who participated in that training are very, very knowledgeable. They have science teachers who use it for real time research, they use word processing, they produce newsletters, they use it as part of a writing tool...

Principal 7.

We have a lunch program where the art teacher teaches graphics on the computer, we cycle upper grades through the lab in their lunch hour, so we have that program. We have a teacher who is working on a news paper, a new teacher that came to us three years ago, who is very proficient on the computer and now she's doing our news paper, and has gotten two or three other teachers involved so the students are learning the graphics of putting together a school newspaper and that really triggered a lot of skills and children's excitement, you know writing and producing. The tech teacher is teaching PowerPoint.

Teachers do their grades and plans using their own personal software which is fine with me, I'm hoping to encourage everyone doing that, and not that I'm so proficient at it I just see that as the way it's got to go.

They're exceptional, but because of this CO-NECT all of the teachers are really working with the computer on high-order thinking skills. That's CO-NECT, so all children do a lot of investigative analysis of different sites and research different sites and write a report and create presentations. They're all into all of that, and I have to say all the grades from the first grade on up...

The most effective way for school leaders to show teachers the benefits of technology integration, is to engage them in developing a shared vision of school improvement (Byrom, 1998). School improvement that is articulated in the district technology plans will indicate to staff members reasonable expectations for success (Means & Olson, 1994).

Concept 10: Technology Integration

Principal 1.

...we used to have a separate curriculum for technology and we felt that is was not the way to go. It shouldn't be isolated, that it should be integrated, and that with any of the curricula that are written, they will be designed siting specific activities or resources where technology is used and setting them up according to the core curriculum standards.

Principal 2.

...we kind of did away with our separate technology curriculum for a while until we could get going, and now it's teaching these different skills but then applying them to the curriculum at each grade level where the teacher would like to do it.

Principal 3.

Kindergarten up until fifth grade are assigned computer time...and it's their curriculum, there's a curriculum for them to follow for our computers for all the children. Like I said we have a [technology] curriculum, a district wide curriculum for K through twelve.

Less than three percent of schools are at the leading edge of effectively integrating technology into classroom practices. Schools that have and use technology number approximately twelve percent, however those schools are not devoting adequate time and resources for curriculum integration (Byrom, 1998).

Principal 4.

I have to get the teachers to understand and use that kind of technology, because right now, I think it's thinking of using higher-order thinking skills instead of just using it.

Hannafin and Savenye (1993) suggest possible reasons for teachers resistance and non-use of computers in the classroom include: unsupportive administrators, increased time and effort required of the teacher, doubt that computers improve learning outcomes, poorly designed software, resentment of the computer as a competitor for students' attention, and fear of losing control of center stage.

Principal 5.

We do imbed it [PowerPoint] into our curriculum, our students do use it. We have a couple of different programs. We use Educational Structure to design lesson plans AOL At School is a good reference. We also use technologies such as Gateway Destinations in our classrooms where we have it. We have Obviously Unlimited...we use an INET library which was a reference educationally for teachers to use as far as Internet access is concerned.

Principal 6.

This was a very technological school. They used Learner Active. Learner Active is a style of teaching using computers to do research and small group process as the main learning tool for children. So, we're talking about big time technology people here.

Principal 7.

So, what I' asked her to do is to work next semester in the class leave the lab open for teachers who would like to bring their class down, now that they're comfortable, can get down there and have their period down here instead of in the class, and she would be more of a collaborator in the classroom and work it out that way, so we'll see. That's the future for us right now.

The school is in a whole school reform. So, we're in CO-NECT, the company that we deal with is CO-NECT, and their premise is...they're helping us to see how technology fits in to a project based learning.

Concept 11: Integration of Classroom Technology

Principal 1

We've had school goals which focus on the implementation and integration of technology that was two years ago. One of the things that I do when looking at lesson plans is to...because we have five computers in each classroom as well as a lab, to see how staff are making use of technology within their classrooms...

Principal 2.

We had the teachers...the teachers had to go with their classes to the technology lab... The computer teacher would start with teaching whatever skills each grade level was at, and then the teacher at the grade level had to decide what she was going to do with the skills.

...and they're actually integrated with whatever subjects, so they're really using them (computers) like another tool like pencil and paper...

A report prepared by Interactive Educational Systems Design, Inc. concluded that "the use of technology as a learning tool can make a measurable difference in student achievement, attitudes, and interaction with teachers and other students" (Wellburn, 1996).

Principal 3.

We have a classroom...a thing called classroom connections, where teachers up-date it almost every two months. They'll up-date what's happening in the classroom; new projects going on, or they're involved in some new project or activity or something or what they're doing in various academics.

...in grade three, four, and five each classroom has approximately three some have maybe four computers for students to do individual assignments for teachers, Internet work, whatever.

Principal 5.

We do have a template that teachers use to keep a library of lesson plans and help them become better master teachers, creating a book of lessons daily and then being able to adjust them through the years and make a collection...and then these people become master teachers which would lead right in to teaching from the standards which is what we're striving to become.

Principal 6.

This was a very technological school. They used Learner Active. Learner Active is a style of teaching using computers to do research and small group process as the main learning tool for children. So, we're talking about big time technology people here. The teachers were big time technology and then of course we had laptops, teachers had laptops, we had computers in the classroom, we had Internet access, we had all kinds of things. And then, this guy came in, took everything away, and so for the first year, last school year, my teachers had literally nothing.

There's a lot of software available. The teachers for years were given...teachers for years under this Learner Active program...we didn't buy textbooks, we bought computer software. It's almost like they went to the extreme. We're going to use computers and Internet around here, and the parents said where's the textbooks, and so they became disenchanted over six, seven, eight, with that.

So there' a lot of software on hand. We had a lot of money. In a district this size maybe ten thousand dollars a year devoted to buying computer software. It's been the possession of each individual teacher. It's not cataloged. It's not in any one spot. It's the teacher's possession.

I think some of the special area teachers have difficult...for example, the health teacher, the phys ed teacher who teaches health. I would like to see him and her use more computer Internet information in their classrooms, but they don't necessarily have access to one. The Spanish teacher who might be able to incorporate some of the things that he could get to in his lessons doesn't have access to that in the classroom. There are still pockets of people who could use the computer better if we had more access.

Principal 7.

All the classrooms have three to four computers, at least one Gateway in every class. She [the computer teacher] has done training for teachers who were so apprehensive and now so comfortable with working with the computer, I mean it's still not where we would like it to be, but they're at least using the computer; the computers are on during the day.

... and because we're aligned with William Paterson she [the ETTC tech} spends one day a week with us and is in the classroom and as they teacher is teaching shows her how she can incorporate the computer into her teaching; which sites children can go on, having children come over to the computer and actually researching.

She's [the computer teacher] going to schedule going in to the classrooms and being there visibly to show the teachers how the computers can be utilized a lot more than they are, and that's where we need the help, you know the lab know they're

comfortable there, they work on the computers, we have the LCD you know so there comfortable using that, some of the teachers are, but they don't see the connection in the room, you know they don't see that as another tool, so they're utilizing over-heads and other technology equipment, calculators and so on, but the computers are on but they're not utilized as much as they could be.

...the teachers sometimes don't see their classroom computer as being a place to go rather than down to the lab, but again what the computer teacher is currently doing is, she's having them put all their project work on floppys and we got all the teachers so the could go upstairs and put it in...

Research suggests that technology use in the classroom is more effective if the classroom teacher receives training, if there is district support, and if they have a network of other computer-using teachers to share experiences with (Wellburn, 1996).

Dwyer et al., (1991), suggests that teachers instructional philosophies change with the use of technology. They become more experimental, student-focused, and collaborate with other technology using teachers.

Principal 8.

We have a part time technology resource person and I work with her to go along with how I want technology to be used, so the teachers aren't spending time on how to use Microsoft Word, but she's working with them opening up the curriculum, opening up the textbooks, finding how their going to create these projects...

One of the things we do, also is we'll have a cut across grading where we'll have some of our forth graders who maybe if they're working on some project with computers in the classroom and they're filled up, they will go into the classroom with fifth graders

and sixth graders, so we have that in place, so that we're really trying to maximize the use of our computers...

Technology generally takes about four to five years to be seamlessly integrated with traditional instruction. This requires a commitment to professional development and technical support (Sheingold & Hadley, 1990).

Teachers who participated in the ACOT studies developed both traditional and non—traditional learning and teaching. It was noted by Dwyer, (1994) that students experienced more peer collaboration and teachers used experimental methods due to administrators flexibility in changing the classroom environment and rearranging schedules to accommodate different pattern of teaching and learning.

Concept 12: The Use of Technology in Writing Curriculum

Principal 1.

I was able to work with the committee to have them really delineate rather carefully those web sites, those activities which would be technologically based. I provided them... there's just a whole host of web sites that I was able to put together for them...so that when our curriculum was set up...this was just approved... you know that they have different web sites, that are available, that are recommended for people as they hit in addition to that, you know in terms of the activities that we have listed. You'll see as you go through different pieces of technology and how they're integrated with them.

Principal 2.

We used a program that aligned all of our curriculum that we...it was software that we bought with maybe another district, cause it was very expensive, and then we met as principals and aligned our curriculum to the core curriculum.

Principal 3.

...and just recently we distributed a disk to every teacher...with all the standards on there from the state...All the teachers have a copy of it so they can load it up in their classroom, so they have all the standards and they know how to align them...

Principal 5.

...it should be used to help critical thing and higher learning process. We have lesson plan templates, if it was truly designed...it was our original template had the core curriculum standards imbedded into the program, so people would be able...teachers actually design their lessons are able to include the standards on a drop down which would then help them to plan for better lessons. We do have a template that teachers use to keep a library of lesson plans and help them become better master teachers, creating a book of lessons daily and then being able to adjust them through the years and make a collection...and then these people become master teachers which would lead right in to teaching from the standards which is what we're striving to become.

We use Educational Structure to design lesson plans

Principal 8.

We have a new curriculum program that we just purchased Ed-Vision...It's a computer software program.

Concept 13: The Availability and Accessibility of Technology

Principal 1.

In our media center we certainly have computers set up. We share Destination 2000, that's the T.V. monitor and projector that goes along with that. But we have a lab of twenty three PCs, and the kids go there...they're scheduled for two periods a week,

and at least we alternate that, so it's...and then they go there on a as need or sign –up basis you know to do some joint projects, so in addition to what's going on in the classroom we have the lab...we have five computers in every classroom...

Principal 2.

What we've done is, we have this technology coordinator, she orders all our software, she has it all organized and has it out in the classrooms.

All of the students have access to the Internet, using the Internet a lot here.

...every teacher has one hour of lab time, but there's open lab during the rest of the time...so teachers are not just using it for that one hour, they're using it a lot.

We have a lab and the teachers each have two computers in their classrooms with a printer.

...we have a computer club after-school where the kids can stay and work on computers.

"The move away from the traditional classroom is influenced by a number of recent developments outside the call for education reform such as new developments in telecommunications, increased use of the Internet, proliferation of affordable hardware and software, and growing acknowledgment among policy makers that proper use of technology has the potential to improve teaching and learning. A variety of excellent programs are in operation, which demonstrate that technology-rich schools result in richer classroom content, higher student achievement, lower dropout rates and improved attitude and enthusiasm for learning" (Charp, 1999, p. 1).

Principal 3.

We have a computer club for students after-school...It's for students in grade four and five. It's about three times a week they meet after-school...they do all kinds of applications.

Principal 4.

...each classroom has four student computers hooked up to the Internet and there's a teacher computer also, a teacher station with a TVator in every classroom. We also have a lot of money to buy different software packages, and not necessarily but like the disks, but they can just put a program on the computer for the teachers to use... The in room computer usage, I know for fact the teachers do allow, like I said mostly in general language arts, science, and social studies, time to do projects, to do research, to look up things.

Teachers who have five or more computers in the classroom are more likely to give frequent computer assignments even when the computer lab holds fifteen or more computers. Even when the number of in class computers falls below five, teachers who have convenient access to computers will be more likely to use them frequently (Becker, Ravitz, & Wong, 1999).

Principal 5.

All of our teachers have wireless lap top computers that they have with them every day so they bring them to their professional development period.

...it's funny the district giving you constructive criticism has all the bells and whistles but doesn't have the players to use it or the support to use it in the right direction.

We have two computer labs with twenty five computers in each lab. In other classrooms there are three computers in a growing majority of classrooms. There are these Gateway destinations which are big screen TV hooked up to DVD players, the Internet, VCR's, laser discs, any type of technology that you'd like to put in on it. Everybody is Internet accessed. Everybody has there own e-mail account staff and student-wise. All staff is on a wireless network with there own laptop computers, so there's all there for people to use.

The only problem we run in to is the support, the human resource support piece on it, we don't support it enough, and the equipment is not changing as quick as the technologies are changing, so we're running into old equipment problems.
We have all the bells and whistles and...but now it's suffering from going too fast I think. I really believe that we need more human resource in this building, in this district. One hundred percent (of students have continuous access to technology in school).

Maddox (1991) suggests the conditions necessary for meaningful integration of computer technology are: availability of excellent software in all content areas; sufficient access to computers and necessary hardware in individual classrooms; and teacher interest and expertise in educational computing.

Principal 6

The teachers were big time technology and then of course we had laptops, teachers had laptops, we had computers in the classroom, we had Internet access, we had all kinds of things. And then, this guy came in, took everything away, and so for the first year, last school year, my teachers had literally nothing.

I had said to you that we got this guy fired and we got somebody on here who loads on to the computers in the classroom the pieces of software that the teachers have purchased that supports learning. So, we now have a technology person who will load onto the computers that presently exist, the software that the teachers want.

We can complain about what we don't have but I try to use what we have. A lot of them use it, but because of the technology problems that we had, I couldn't. On any given day the Internet's not working. We have hardware problems that are not solved. We have a server that doesn't have enough ports to support all the computers that exist on any given day, particularly in this building, Internet access could be down. Every classroom doesn't have computers; fifth through eighth have computers, a combination of Macs and PCs. Below that there's no consistency to what they have. They have some. Some of them have old Apples. I mean there's probably something in every classroom, but nothing of note below fifth grade.

Teachers need to know what resources are available to them, how to use the technologies for their own use and instructional purposes, and they need access to the technologies to become more proficient with the medium of their choice (OTA, 1995). Teachers also need to have access to personnel who's familiarity with technology and learning environments will enable them to successfully integrate technology into the classroom (Riedl et al, 1998).

Principal 7.

I would say last year we spent close to a hundred thousand dollars on all aspects of technology. This year it hasn't been as lucrative, because of budget constraints, but last year we did. But by building, it wasn't because of the Abbott situation, it was just a

commitment, and we just feel that we have enough people in the building who will utilize...it was worth the investment in other words.

Principal 8.

All the computers here are archaic and I had to beg for that when I started here. Right now we're looking at purchasing three-hundred new computers for the whole district under lease purchase using money from _____ _____, because everything is just broken.

Concept 14: Community Involvement

Principal 1.

the task force that was set up...it's an interesting piece, it's made up of administrators, board members, community members, and we're fortunate that we have a number of parents and individuals who own their own companies, software companies, you know, have arranged to set up wiring...we had the wired schools

Principal 2.

We've got to find ways to make it safe for them and use the Internet and even things like having a homework line, they (the community) didn't want it because they said it was a crutch or something.

We started with the committee and there was a lot of community involvement with that which was great.

Anderson and Dexter (2000), report that one of the most important technology leadership attributes is the formation of technology committees.

Principal 3.

We have these things called parent academies...and we'll run throughout the year over the past couple of years they've had maybe four parent academies a year...and they're different topics, and always one has been a technology...that is the one that is probably most attended.

Principal 4.

I'm actually pretty excited because I just got two parents just this last week started e-mailing me, and that's the first two parents I've ever had that really started to...

...each school has their own web page that we up-date the reading scores, with the calendar, with different up-coming events, with pictures of things that are going on, with the newsletter...we put all that on our web page for the community to see, and the tech coordinator is part of the technology plan, provides parents with technology training, so they can come in and learn how to use the computer.

Principal 5.

The big technology that we us in this district is an electronic grade book that's really been an off-shoot to how the staff gets involved. Al of our grades are done electronically on a grade book and it gets...it actually...it's imported into our administrative system and then we have a third piece that's called Pair Connect, Pair Connect puts the grade book or a copy of the grade book out on the web and then parents through a pass word and I.D. number can see how their kids are doing. So it really fosters the communication between the school and the parents. Parents can check it at work, daily, it's really great stuff.

There's one piece of community involvement, it's an organization in _____ that supports technology, they work with businesses to help bring things into the building. ... many companies outside the community came to our building, came to our school...pilot this for us...we want you to be the pilot district for this program. The Para-Connect program I was talking to you about is...we're the first in the Northeastern part of the United States to do that. We reap benefits from becoming a model district in technology. Companies outside of the community came to us because we would use it and try it out.

Principal 6.

I guess the community involvement became, we want to see something more than just Learner Active, that wasn't enough.

Principal 7.

It's not enough. I mean we've had some parents' workshops you know just a one shot deal not a series of classes which is what we would like to do. We would like to have the parent sitting with their child, you know seeing what the child can do to help them become more comfortable, because I think that would be helpful. We've talked about it but we haven't gotten into it, but as part of our action plan for the next three years that's part of the plan that there will be workshops with parents and children.

Means et al (1993) suggests as with all successful forms of school reform, technology integration shows that "the chances for success are increased when parents and the community buy into the instructional goals of the reform and understand the implications in terms of costs, other forgone activities, and likely effects on tests scores" (p. 90).

Principal 8.

They had a networking day where all the parent ran all the wires several years ago. We have parent volunteers who run our web page; created it, up-date it. In the computer lab itself I have two parent volunteers, two parents every period come in and help teacher, just input programs and help the kids. A lot of parent involvement over-all here.

Table 1 shows the organization of concepts in the three themes: Standards, Skills and Competencies, and Technology Integration.

Table 1

Standards	**Skills and Competencies**	**Technology Integration**
Vision of technology	Technology Competencies of the Principal	Student and Teacher Engagement
Principal as Professional Development Provider	Modeling Technology Use	Technology Integration
Principal as Professional Development Enabler	Principal as PD Recipient	Integration of Classroom Technology
The Sharing of Information	Maintenance of Technology Equipment	Curriculum Using Computer Applications
Technology Assessment		Availability and Accessibility of Technology
Interpersonal Relationships		Community Involvement

Results

The interview questions were intended to be open-ended and allow for wide parameters of interpretation. The responses of the principals have been categorized by concept, as mentioned in chapter three.

Research Question 1. To what extent do elementary principals relate to leadership technology standards in their professional practice?

To answer the first research question, the concepts of technology vision, professional development, sharing information, interpersonal relationships (collaboration), and assessment are used to corroborate the link between the leadership technology standards in the literature, principal interviews, and research questions. As discussed in detail, in chapter II, the technology standards are from the Technology Standards for School Administrators (TSSA), the Southern Regional Education Board, the Interstate School Leaders Licensure Consortium, the International Technology Education Association (ITEA), Advanced Programs in Educational Leadership for Principals Superintendents, Curriculum Directors and Supervisors (EDLEA), and the New Jersey Department of Education Technology Vision and Benchmarks by 2002. To identify the concepts in each of the interviews, salient elements are extracted. The following section is organized by technology standard followed by the response of the principal.

Principal 1

Technology vision.

Participate in an inclusive district process through which stakeholders formulate a shared vision that clearly defines expectations for technology use (Technology

Standards for School Administrators, TSSA, Standard 1) (ISTE, 2001b). Understand the elements and characteristics of long-range planning for the use of current and emerging technology (Standard, Southern Regional Education Board). Principal 1 shares the district technology goals and five year plan with the staff.

Develop collaboratively a technology-rich school improvement plan, grounded in research, aligned with the district improvement plan, and congruent with the district vision for technology use (TSSA, Standard 2) (ISTE, 2001b). Principal 1 is involved in committee work whereby technology is carefully integrated into the curriculum using the NJCCCS as a framework.

Professional development.

Allocate campus discretionary funds and other resources to advance implementation of the technology plan. Advocate for adequate, timely, and high-quality technology support services (TSSA, Standard 9) (ISTE, 2001b). Principal 1 plans to up-grade professional development and indicates that many of the staff attend New Jersey TEXPO.

Sharing information.

Provide campus-wide staff development for sharing work and resources across commonly used formats and platforms (TSSA, Standard 8) (ISTE, 2001b). As a coordinator for New Jersey Best Practices, Principal 1 devoted a half day to the sharing of Best Practices among the sending districts.

Technology assessment.

Implement evaluation procedures for teachers that assess individual growth toward establishing technology standards and guide professional development planning

(TSSA, Standard 12) (ISTE, 2001b). In a joint curriculum mapping committee session it was determined that technology evaluation become a priority to determine technology effectiveness (Principal 1).

Principal 2

Technology vision.

Develop a collaborative, technology-rich school improvement plan, grounded in research and aligned with the district strategic plan (TSSA, Standard 2) (ISTE, 2001b). A school administrator is an educational leader who promotes the success of all students by facilitating the development, articulation, implementation, and stewardship of a vision of learning that is shared and supported by the school community (ISLLC, Standard 1) (ISLLC, 1996).

Principal 2 based the concept of shared vision on committee membership. Collaboration is an important part of the shared vision.

Possess a "big picture" vision of technology in education and schools – reform movement, competency-based education, standards, time allocation (Southern Regional Education Board, 2000). Principal 2 possessed a "big vision" for technology which had a profound impact on personnel.

Professional development.

Collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improved student learning (TSSA, Standard 5) (ISTE, 2001b). Apply adult learning strategies to professional development, focusing on authentic problems and tasks, and utilizing mentoring, coaching, conferencing and other techniques to ensure that

new knowledge and skills are practiced in the workplace (EDLEA, Standard 4.2) (NCATE, 1995). All teachers will have the skills and knowledge needed to use educational technology as an effective tool to support achievement of the Core Curriculum Content Standards. The state's system of Educational Technology Training Centers will continue to offer the highest quality professional development opportunities for educators in cooperation with additional local preservice and inservice training (NJDoE, Benchmark 4) (Vision and Benchmarks by 2002, 2002). Principal 2 places emphasis on staff development and provides activities in the workplace to ensure the staff's involvement. Teachers participate in ETTC course offerings.

Sharing information.

Provide campus-wide staff development for sharing work and resources across commonly used formats and platforms (TSSA, Standard 8) (ISTE, 2001b). Principal 2 uses staff meetings to turnkey (share) information about technology.

Interpersonal relationships.

Use appropriate interpersonal skills (EDLEA, 7.1) (NCATE, 1995). A school administrator is an educational leader who promotes the success of all students by advocating, nurturing, and sustaining a school culture and instructional program conducive to student learning and staff professional growth (ISLLC, Standard 2) (ISLLC, 1996). Principal 2 used interpersonal relationship skills as primary criteria for the selection of technology coordinator and placed less emphasis on technology skills.

Technology assessment of instructional staff.

Include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff (TSSA, Standard 13) (ISTE, 2001b).

Principal 2 looks for the use of technology during teacher observations.

Principal 3

Technology vision.

Promote highly effective practices in technology integration among faculty and other staff (TSSA, Standard 3) (ISTE, 2001b). Principal 3 describes in terms of practice and on-going tangible activities e.g. network communication, school web-site.

Professional development.

Collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improving student learning (TSSA, Standard 5) (ISTE, 2001b). Principal 3 encourages teachers to attend technology workshops sponsored by the supervisor of technology.

Allocate campus discretionary funds and other resources to advance implementation of the technology plan (TSSA, Standard 9) (ISTE, 2001b). Principal 3 is unable or unwilling to pay for all teachers to attend technology related workshops.

Sharing information.

Provide campus-wide staff development for sharing work and resources across commonly used formats and platforms (TSSA, Standard 8) (ISTE, 2001b). Principal 3 lets teachers share information on their own and not part of a formal routine.

Interpersonal relationships.

Use appropriate interpersonal skills (EDLEA, Standard 7.1) (NCATE, 1995).

Principal 3 displays an appreciation of the expedient manner in which the technicians service any problem "which is kind of nice".

Technology assessment of instructional staff.

Include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff (TSSA, Standard 13) (ISTE, 2001b).

During observations, Principal 3 requests that teachers demonstrate the effective use and integration of technology into all areas.

Principal 4

Technology vision.

Participate in an inclusive district process by which stakeholders formulate a shared vision that clearly defines expectations for technology use (TSSA, Standard 1) (ISTE, 2001b).

A school administrator is an educational leader who promotes the success of all students by facilitating the development, articulation, implementation, and stewardship of a vision of learning that is shared and supported by the school community (ISLLC, Standard 1) (ISLLC, 1996).

Principal 4 characterizes school vision as a shared vision, or a collaborative process.

Professional development.

All teachers will have the skills and knowledge needed to use educational technology as an effective tool to support achievement of the Core Curriculum Content

Standards. The state's system of Educational Technology Training Centers will continue to offer the highest quality professional development opportunities for educators in cooperation with additional local preservice and inservice training (NJDoE, Benchmark 4) (Vision and Benchmarks for 2002, 2002). Principal 4 relates professional development to the proficiency of the state's technology standards.

Work with faculty and other stakeholders to identify needs for professional development, to organize, facilitate, and evaluate professional development programs, to integrate district and school priorities, to build faculty as resource, and to ensure that professional development activities focus on improving student outcomes (EDLEA, Standard 4.1) (NCATE, 1995). Implement evaluation procedures for teachers that assess individual growth toward establishing technology standards and guide professional development planning (TSSA, Standard 12) (ISTE, 2001b). With the technology coordinator, Principal 4 determines the needs of each teacher and discusses the professional development for those needs.

Sharing information.

Provide campus-wide staff development for sharing work and resources across commonly used formats and platforms (TSSA, Standard 8) (ISTE, 2001b). Principal 4 uses the monthly grade level meetings for teachers to share information.

Technology assessment of instructional staff.

Include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff (TSSA, Standard 13) (ISTE, 2001b).

Principal 4 uses both lesson plans and teacher observation to specifically look for technology in the lesson.

Principal 5

Technology vision.

Possess a "big picture" vision of technology in education and schools – reform movement, competency-based education, standards, time allocation (Standard, Southern Regional Education Board). Principal 5 describes technology vision as a commitment to integrating technology into the learning process and the learning environment. Promote highly effective practices in technology integration among faculty and other staff (TSSA, Standard 3) (ISTE, 2001b). Principal 5 further describes vision as expectations to becoming more proficient in the use of technology.

Use motivational theory to create conditions that motivate staff, students and families to achieve the school's vision (e.g. facilitate collegiality and teamwork, arrange significant work, encourage challenging standards, provide autonomy, support innovation, delegate responsibility, develop leadership in others, provide leadership opportunities) (EDLEA, Standard 1.2) (NCATE, 1995). And then, what I try to do is promote leaders from within, teachers that do well in technology and are proficient, and I want them to help and support it at the building level (Principal 5).

Professional development.

Assist teachers in using technology to access, analyze, and interpret student performance data, and in using results to appropriately design, assess, and modify student instruction (TSSA, Standard 4) (ISTE, 2001b). Collaboratively design, implement, support, and participate in professional development for all instructional staff that

institutionalizes effective integration of technology for improving student learning (TSSA, Standard 5) (ISTE, 2001b).

Principal 5 personally designs and conducts professional development for staff. Re-aligns schedules to allow for daily professional development.

Use motivational theory to create conditions that motivate staff, students and families to achieve the school's vision (EDLEA, Standard 1.2) (NCATE, 1995). Principal 5 indicated that the support and belief in technology comes from the leader of the building.

Sharing information.

Provide campus-wide staff development for sharing work and resources across commonly used formats and platforms (TSSA, Standard 8) (ISTE, 2001b). Principal 5 describes sharing as, teachers teaching each other, kids teaching teachers. Sharing is an important piece.

Interpersonal relationships.

Use appropriate interpersonal skills (EDLEA, Standard 7.1) (NCATE, 1995). Develop abilities to use and maintain technological products and systems (ITEA, Standard 12) (ITEA, 2001). The good working relationship Principal 5 has with the technology coordinator is in part due to the principal's ability to troubleshoot many of his own technology problems.

Technology assessment of instructional staff.

Promote and model the use of technology to access, analyze, and interpret campus data to focus efforts for improving student learning and productivity (TSSA, Standard 11) (ISTE, 2001b).

Principal 5 uses SASSI for student data collection and the evaluation of student and teacher behavior. Principal 5 uses the Electronic Grade Book to assist in decision making.

Implement evaluation procedures for teachers that assess individual growth toward establishing technology standards and guide professional development planning (TSSA, Standard 12) (ISTE, 2001b). Principal 5 used the ELITE school survey to determine the technological strengths and weaknesses of the staff in an effort to improve instruction and student learning.

Principal 6

Shared technology vision.

Frame, analyze, and resolve problems using appropriate problem solving techniques and decision making skills (EDLEA, Standard 1.3) (NCATE, 1995). Principal 6 discussed her vision which includes: networking, communication, Internet hook-up, and technology as a seamless tool.

Professional development.

Collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improving student learning (TSSA, Standard 5) (ISTE, 2001b). Principal 6 participates in the districts professional development academy.

Interpersonal relationships.

Advocate for adequate, timely, and high-quality technology support services (TSSA, Standard 10) (ISTE, 2001b). Principal 6 was integral in removing the technology coordinator who was a hindrance to the support and service of technology.

Technology assessment of instructional staff.

Principal 6 explained that due to the extraordinary circumstances regarding technology in her school, it is not realistic to assess instructional staff at this time.

Principal 7

Shared technology vision.

Possess a "big picture" vision of technology in education and schools – reform movement, competency-based education, standards, time allocation (Standard, Southern Regional Education Board, 2000). Principal 7 describes a shared vision as a financial commitment that the school management team also supports.

Professional development.

Collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improving student learning (TSSA, Standard 5) (ISTE, 2001b). Principal 7 allowed the computer teacher to have an after-school program for teachers.

Sharing information.

Collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improving student learning (TSSA, Standard 5) (ISTE, 2001b). Principal 7 discussed the school's technology training program though CO-NECT and the William Paterson Partnership Grant.

Provide campus-wide staff development for sharing work and resources across commonly used formats and platforms (TSSA, Standard 8) (ISTE, 2001b). Small groups

of teachers are receiving technology training then return to share the information with the rest of the staff (Principal 7).

Technology assessment of instructional staff.

Include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff (TSSA, Standard 13) (ISTE, 2001b).

Principal 7 indicated that is her intention to use technology assessment as an additional criterion in the coming year.

Principal 8

Shared technology vision.

Frame, analyze, and resolve problems using appropriate problem solving techniques and decision making skills (EDLEA, Standard 1.3) (NCATE, 1995). Principal 8 would include technology into the classroom directly relating to curricular areas.

Professional development.

Collaboratively design, implement, support, and participate in professional development for all instructional staff that institutionalizes effective integration of technology for improving student learning (TSSA, Standard 5) (ISTE, 2001b). Apply adult learning strategies to professional development, focusing on authentic problems and tasks, and utilizing mentoring, coaching, conferencing and other techniques to ensure that new knowledge and skills are practiced in the workplace (EDLEA, Standard 4.2) (NCATE, 1995). Principal 8 developed before-school technology training sessions. The

technology training is geared at different levels of learning to accommodate the various levels of technology usage.

Interpersonal relationships.

Advocate for adequate, timely, and high-quality technology support services (TSSA, Standard 10) (ISTE, 2001b). Principal 8 explains that the new technology coordinator is more open minded and less controlling and interfering in educational technology matters.

Technology assessment of instructional staff.

Implement evaluation procedures for teachers that assess individual growth toward establishing technology standards and guide professional development planning (TSSA, Standard 12) (ISTE, 2001b). Include effectiveness of technology use in the learning and teaching process as one criteria in assessing performance of instructional staff (TSSA, Standard 13) (ISTE, 2001b). In the coming year, Principal 8 will include a web-quest or tele-collaborative project in the school goals.

Table 2 summarizes the standards that principals adhered to while performing duties associated with corresponding concepts.

Table 2

	Vision	Professional Development	Sharing Information	Inter-Personal Relationships	Assessment of Instructional Staff
Principal 1	TSSA 1 SREB TSSA 2	TSSA 9	TSSA 8		TSSA 12
Principal 2	TSSA 2 ISLLC 1	TSSA 5 EDLEA 4.2 NJDOE 4	TSSA 8	EDLEA 7.1 ISLLC 2	TSSA 13
Principal 3	TSSA 3	TSSA 5	TSSA 8	EDLEA 7.1	TSSA 13
Principal 4	TSSA 1 ISLLC 1	NJDOE 4 EDLEA 4.1 TSSA 12	TSSA 8		TSSA 13
Principal 5	SREB TSSA 3 EDLEA 1.2	TSSA 4 TSSA 5 EDLEA 1.2	TSSA 8	EDLEA 7.1 ITEA 12	TSSA 11 TSSA 12
Principal 6	EDLEA 13	TSSA 5		TSSA 10	
Principal 7	SREB	TSSA 5	TSSA 5 TSSA 8		TSSA 13
Principal 8	EDLEA 1.3	TSSA 5 EDLEA 4.2		TSSA 10	TSSA 12 TSSA 13

Research Question 2. What technology skills and competencies do elementary principals use?

To determine the skills and competencies used by elementary principals in professional practice, the responses from interview questions 6, 7, and 11-19 are used to develop the following concepts: maintenance of technology equipment; computer applications skills, and; administrative professional development. The literature that corresponds to the data is found in chapter two.

Maintenance of technology equipment

> "Technology leaders require knowledge in the area of planning, designing, and evaluating technology and staff development programs. The technical aspect of the position requires knowledge and skills pertaining to information access tools that can support curriculum and instruction. Having the ability to evaluate,

> troubleshoot, install, and maintain computer operating systems, software, and hardware that support classroom and administrative needs is also a top priority. The bottom line is that the technology leader needs to be very knowledgeable about curriculum and instruction in addition to having the skills to implement and maintain a variety of technologies and network systems" (Ford, 2000 p. 91).

Develop abilities to use and maintain technological products and systems (ITEA, Standard, 12) (ITEA, 2001). Principal 5 will stop anything he is doing to fix someone's laptop or help them out with their electronic grade book in which he does all of the programming and securities. Principal 5 troubleshoots a lot of the problems himself. Principal 8 fixes both hardware and software problems, e.g. if the computers go down in the lab or various printing problems.

Technology-based Student Record Keeping

Technology-based student record keeping is limited to attendance by principal 2 and principal 8. The UNIX system is used by principal 4, and principal 5 uses InteGrade Pro and PAIR Connect, which are components of SASSI.

Word Processing

Microsoft Word is used by all of the principals except for principal 1 apparently due to lack of typing skills. Principal 5 is also using a Palm Pilot in addition to the laptop and PC.

Database

Principals 4 and 5 both reported using Excel for database while principal 5 went into some detail to describe the importing and exporting of data specifically for IEPs. Principal 5 also uses SASSI to import and export student data. Principal 8 uses Access.

Spreadsheet

Principal 1 indicated that he played around with Excel, while principals 2 and 8 are regular users of Excel. Principal 2 uses excel to track discipline. Principal 4 uses spreadsheets primarily for mail merges. Principal 5 uses Microsoft Office spreadsheet applications.

E-mail

All of the principals reported using e-mail except for principal 3.

Presentation Applications

Principal 1 indicated that he was just learning PowerPoint, while principal 2 enjoys using PowerPoint. Principals 5 and 6 use digital camera technology and import it into PowerPoint. Principals 4 and 8 use PowerPoint.

Desktop Publishing

Principal 5 uses both Microsoft Publishing and Print Shop. Due to work on a monthly newsletter, principal 6 uses Microsoft Publishing.

World Wide Web and Search Engines

Principal 1 uses the Internet every day. Principal 2 uses Netscape Communicator. Principal 3 reported using his own web-sites and search engines. Principals 4, 5, and 8 use the Internet for research, while principal 8 also uses the Internet for personal use.

Statistical Applications

Only principal 5 reported using statistical software, the Electronic Grade Book, which is part of the SASSI system.

Technology-Based Student Scheduling

Principal 5 has become an expert in the use of SASSI. Principal 8 uses Max-School for student scheduling.

Administrative Technology Professional Development

Principal 1 and 5 are both attending New Jersey ELITE. Principal 5 has also gone to Reading, PA., to receive training in SASSI. Principal 8 has gone to San Diego for training in Ed-Vision.

Table 3 summarizes the technology skills and competencies of the principals.

Table 3

	P. 1	P. 2	P. 3	P. 4	P. 5	P. 6	P. 7	P. 8
Main-tain Tech. Equip.					trouble-shoot and make repairs			fix things
Student Record Keeping		attend-ance		UNIX	SASSI Integrade -Pro PAIR-Connect			attend-ance
Word Process.		Word	Word	Word	Word Palm	Word	Word	Word
Data Base				Excel	SASSI Excel			Access
Spread Sheet	played around with Excel	Excel		for mail merge	Micro-Soft Office			Excel
E-mail	E-mail every day	E-mail to faculty		E-mail	E-mail	Some E-mail	I just have an e-mail address	E-mail
Present-ation Applic.	learning Power Point	enjoy using Power Point		Power Point	Digital Camera Power Point	Digital Camera Power Point		Power Point
Desktop Public.					Micro Soft Publish Print Shop	Micro Soft Publish		
www and Search Engines	every day	Netscape Comm.	my own Web-sites and search engines	for research	research			research personal use
Stats. Applic.					Elec-Tronic Grade Book			
Schedule Applic.					SASSI			Max-School
Admin. Prof. Dev.	ELITE				ELITE SASSI			Ed-Vision

Research Question 3. How do elementary principals integrate technology into the educational environment?

The data used to answer research question 3, are found in the concepts of Student and Teacher Engagement, Technology Integration, Integration of Classroom Technology, Using Technology To Write Curriculum, Availability and Accessibility of Technology, and Community Involvement. The corresponding literature is found in chapter two.

Principal 1

Student and teacher engagement.

One of the thrusts has been to promote higher-order thinking skills...we have 262 kids and would hope to some degree that's being done. [Wenglinsky's] findings suggest students who used computers for "drill and skill" purposes performed worse on the NAEP than those students who did not use computers (for that purpose), however eighth grade student who used computers for simulations and applications (associated with higher order thinking) performed better on the NAEP than those students who did not (Milken Excgange, 2001).

Technology integration.

The curriculum for technology should not be separate or isolated, it should be integrated with any of the curricula that are written (Principal 1).

Integration of classroom technology.

Principal 1 uses lesson plans to see how staff are making use of technology within the classroom.

Using technology to write curriculum.

Principal 1 provided web sites throughout the curriculum process.

Availability and accessibility of technology.

There are twenty-three PC's in the lab, five computers in every classroom, and Destination 2000. Internet access.

Community involvement.

Principal 1 is part of a technology task force comprised of administrators, board members, and community members.

Principal 2

Student and teacher engagement.

Principal 1 indicated that engagement had occurred technologically through the use of software for a new math program (higher-level learning skills), and by presentations using Hyper-Studio.

Technology integration.

The separate curriculum for technology had been done away with and technology skills are now being applied to various segments of the curriculum (Principal 2).

Integration of classroom technology.

Principal 2 had the teachers accompany their classes to the computer lab and integrate the computer skills with classroom curricula.

The use of technology for writing curriculum.

Software, purchased with another district, was used to align curriculum and standards.

Availability and accessibility of technology.

The technology coordinator has al of the software organized. All students have one hour of lab time and access to the lab at additional times. There is an after-school computer club.

Community involvement.

Principal 2 started a technology committee and there was a lot of community involvement.

Principal 3

Student and teacher engagement.

Principal 3 indicated that all students use technology for basic skills and grades three through five use computers for higher-order thinking skills because they have computers in the classroom and more time in the computer lab.

Teacher computer utilization is very high.

Technology integration.

We have a technology curriculum.

Integration of classroom technology.

Using "Classroom Connections", teachers up-date on networked technology.

The use of technology in writing curriculum.

Principal 3 reported distributing the "Standards and Assessments" CD distributed by the New Jersey Department of Education.

Availability and accessibility of technology.

There are four computers in most classrooms, a computer lab, and an after-school computer club.

Community involvement.

Parent academies are offered approximately four times a year.

Principal 4

Student and teacher engagement.

Principal 4 indicated that the technology itself was engaging for the students to the point of becoming classroom management. Students focus on basic skills during school and during the after-school program.

Technology integration.

"I think it's thinking of using higher-order thinking skills instead of just doing it" (Principal 4).

Availability and accessibility of technology.

Principal 4 indicated that each classroom has four student computers with Internet capabilities. There is a teacher station with TVator. Funding is available for software.

Community involvement.

Principal 4 enthusiastically reported that for the first time, two parents e-mailed him.

Principal 5

Student and teacher engagement.

75% of all students are using technology to achieve higher order thinking skills. Thirty to forty percent of teachers are designing technology-based learning experiences.

Technology integration.

Principal 5 reported imbedding PowerPoint into the curriculum. In addition, AOL at School, Gateway Destinations, Internet, and INET library are used to integrate curriculum.

Integrating classroom technology.

The teachers use a computerized template to assist them in keeping a library of lesson plans.

The use of technology for writing curriculum.

Principal 5 reported the use of lesson plan templates with the core curriculum standards imbedded in the program. Educational Structure is used to design lesson plans.

Availability and accessibility of technology.

All teachers have laptops with wireless Internet. There are two computer labs with twenty-five computers in each, and three computers in each classroom. Additional technology includes: Gateway Destination, laser discs, big screen TV, DVD players. All staff and students have their own e-mail account.

Community involvement.

Principal 5 discussed the parent connection using the Electronic Grade Book through Integrade Pro. A community-based organization works to bring business together with the school. As a result many technology companies have come to the school to pilot their product.

Principal 6

Student and teacher engagement.

Teacher 6 reported that the teachers are technologically astute due to their training in Learner Active

Technology integration.

Learner Active is a style of teaching using computers.

Integration of classroom technology.

With Learner Active, teachers use computers and small groups to teach. All teachers had laptops.

Availability and accessibility of technology.

Principal 6 explained that there is an abundant quantity of software from the Learner Active Program. There are hardware problems not solved. The server will not support all the computers. Internet access is frequently down. All classrooms do not have computers and there is a lack of consistency with a combination of Macs, Apples, and PCs.

Community involvement.

The community expressed concerns about the Learner Active Program.

Principal 7

Student and teacher engagement.

Teachers volunteer for technology related activities such as art and computer graphics and the school newspaper. The school newspaper has generated student engagement. Teachers use their own software and programs to do grades and lesson

plans. Because of CO-NECT teachers are using technology for higher-order thinking skills.

Technology integration.

Principal 7 has the computer teacher give instruction in the classroom to integrate technology with other curricular areas.

Integration of classroom technology.

The computer teacher is utilizing the classroom computers to help teachers integrate technology in the classroom.

Availability and accessibility of technology.

Principal 7 reported spending one hundred thousand dollars on technology because of the commitment to technology.

Community involvement.

Parental involvement is not sufficient, but principal 7's action plans include greater parental involvement.

Principal 8

Technology integration.

Principal 8 works with a part time technology resource person to assist teachers in the utilization and integration of technology.

Integration of classroom technology.

To maximize the use of classroom computers, Principal 8 has multiple grade levels working on available computers.

The use of technology for writing curriculum.

Principal 8 uses a curriculum writing program called Ed-Vision.

Availability and accessibility.

The computers are old and broken.

Community involvement.

Principal 8 reported a high level of parental involvement. Parents volunteered to run network wires, run the web page, and assist in the computer lab.

Tables 4 and 5 summarize "how" principals integrate technology.

Table 4

	Student and Teacher Engagement	**Technology Integration**	**Integration of Classroom Technology**
Principal 1	Promotes higher-order thinking skills	Integrates technology curriculum with other curricula	Uses lesson plans to monitor classroom integration
Principal 2	Uses technology driven math program Promotes presentations using Hyper-Studio	Integrates technology curriculum with other curricula	Instructs teachers to integrate computer skills with classroom curricula
Principal 3	Promotes higher-order thinking skills through additional lab time and classroom computers	Uses a separate technology curriculum	Uses a networked classroom computer system
Principal 4	Technology in itself is engaging Focuses on basic skills	"I think [teachers are] thinking about using higher-order skills instead of just doing it"	
Principal 5	75% of students use technology to achieve higher-order thinking skills 30-40% of teachers design technology-based learning experiences	Imbedded PowerPoint into the curriculum Uses AOL at School, Gateway Destinations, Internet, and INET library	Installed a computerized template for teachers to build a library of lesson plans
Principal 6	Reported teachers are technologically astute due to prior training	Learner Active	Learner Active utilizes computers and small student groups
Principal 7	Employs CO-NECT technology integration strategies	Directs computer teacher to instruct in classroom for maximum integration	Computer teacher assists students with classroom computers during curricular integration
Principal 8		Works with technology resource personnel to develop integration strategies	Developed inter-grade level scheduling to allow for maximum classroom computer usage

Table 5

	The Use of Technology for Writing Curriculum	Availability and Accessibility of Technology	Community Involvement
Principal 1	Provided instructional web sites during the writing process	5 computers in every classroom, 23 PCs in lab, Destination 2000, Internet Access	Part of community technology task force
Principal 2	Used software to align curriculum and standards	Organized software, Lab available for additional time, After-school computer club	Part of community technology committee
Principal 3	Distributed "Standards and Assessments" CD	4 computers in each classroom, 1 computer lab After-school computer club	Parent academies offered four times a year
Principal 4		4 computers in each classroom, Internet, Teacher station with Tvator, Funding is available for software	Reported that 2 parents e-mailed
Principal 5	Uses templates with core curriculum and standards imbedded in the program, Educational Structure uses to design lesson plans	All teachers have laptops, 2 labs with 25 PCs each, 3 computers in each classroom, Gateway Destination, laser disks, big screen TV, DVD players, All staff and students have e-mail account	Electronic Grade Book accessed by parents, Community-based organization brings technology businesses to the school
Principal 6		Abundant software, but Hardware problems, Server unable to support all computers, Internet frequently down, No consistency- Macs, Apples, and PCs	Community expressed concerns about Learner Active
Principal 7		Spent $100,000 on technology commitment	Regrets lack of parental involvement
Principal 8	Uses Ed-Vision	Reported computers old and broken	High level of involvement, run network wires, run web page, assist in lab

CHAPTER V

CONCLUSIONS

Summary

In today's technological global society, implications for technology knowledge, skills, and use are far reaching. The educational technology conundrum is perpetuated by a dearth of literature pertaining to administrative technology responsibilities. However, there is a rapidly growing number of studies and professional organizations dedicated to the pursuit of educational and administrative technology.

The purpose of this study is to investigate the leadership technology standards and technology competencies of the elementary principal. Further, the purpose of this study is to examine how and by what means the principal integrates technology into the educational environment.

The essential aspects of school leadership have appeared in the literature for many years. Success or failure of innovations, programs, and the achievement of students is attributed to the vision and leadership of school principals (Cawelti, 1987; Fullan, 1990).

Professional organizations such as the International Society for Technology in Education, and the CEO Forum on Education and Technology are researching and publishing administrative or leadership technology standards and technology integration literature.

Research Method

The qualitative research method used for this study was designed to elicit responses to answer three research questions and provide some insight into the technology programs of eight principals.

The sample population consists of eight elementary school principals from districts representing a full range of district factor grouping.

The research instrument was an open-ended interview designed to facilitate the "process evaluation".

A jury of experts was consulted to provide validity to the interview questions.

Findings

The principal's responses to the first section of interview questions were primarily grouped by concept to answer the first research question. The administrative activities or behavior of the principals corresponded positively to thirteen Technology Standards for School Administrators, five EDLEA Standards, and a number of SREB, ISSLC, and ITEA Standards.

The responses regarding vision were unique in the respect that they mirrored the activities that occurred each principal's school. Only two principals spoke of technology vision as "creative tension", or the gap between the current reality and the future. Six other principals regarded the vision and sharing vision as the current reality.

The eight principals were in agreement as far as the need for technology-based professional development was concerned, while only two principals designed in-school training. Only principal 5 personally provided in-school technology training.

There was little variance in the sharing information concept, principals use traditional meeting times to formally allow teachers to share information.

A sharp contrast appeared in the inter-personal relationships concept. Although the question was never directly asked, principal 2 described her personnel requirements for a technology teacher/coordinator as a possessor of "people skills". Principal 5 described his good working relationship with the technology support person, as in part, due to his [principal 5] ability to troubleshoot technology problems. Both principals 6 and 8 experienced adversarial relationships with previous technology coordinators and in the case of principal 6, to the detriment of the technology program.

The technology assessment of instructional staff is presently used as one criterion for evaluative observations by three principals while two more intend to incorporate it by next year. Principal 1 described assessment as a current inability to evaluate the effectiveness of technology. Although principal 5 provides daily professional development and personal technology training, he does not use technology assessment as one criterion for teacher evaluation. Due to poor technological conditions (availability and accessibility), Principal 6 finds the technology assessment of instructional staff to be unrealistic.

Principal 5 possesses the technology skills and competencies to troubleshoot technology problems, repair hardware, and solve software problems. Principal 8 also has some ability to make repairs.

Word processing, e-mail, presentation applications, Internet use, spreadsheet applications, and to a lesser degree, student record keeping software and database applications are used by all of the principals. Two principals, 5 and 6 use desktop

publications, two principals 5 and 8 use scheduling applications, and only principal 5 uses statistical applications.

Principals 1 and 5 were in attendance of the New Jersey ELITE Program, however direct sponsored training for complex systems and programs (SASI and Ed-Vision) was pursued only by principals 5 and 8.

The prevalent indicator for student and teacher engagement is technology related higher-order thinking skills. The primary use of technology for the acquisition of basic skills was mentioned by two principals. Principal 5 reported that 75% of the students use technology for higher-order thinking skills and 30-40% of the teachers design technology-based learning experiences, yet he [principal 5] indicates that the teachers in his building are not yet comfortable with the new technologies.

Curricular and technological integration has progressed under the leadership of most principals, however principal 3 indicates the use of a separate technology curriculum, and principal 4 indicated that the teachers are not yet able to achieve technology integration.

Principals 3 and 5 have implemented technology to assist in the integration of classroom technology. Principals 2, 7, and 8 have made scheduling changes that essentially provide a co-teaching arrangement between the classroom teacher and the computer teacher and maximize technology use time.

Three of the principals 2, 5, and 8, use software designed to assist in writing or aligning curriculum.

Six principals reported to have between three and five computers in each classroom and adequate quantities of software. Principal 5 indicates that all teachers

have and use laptops, while principals 6 and 8 implied that an abundance of hardware problems inhibit computer usage.

Four principals indicate a high level of community involvement in the technology program, however only principal five has regular communications with parents via technology.

Implications

The actions and behaviors of elementary school principals that fall within the parameters of the previously discussed concepts (vision, professional development, sharing information, and assessment of professional staff) are relatively close to the role-specific technology leadership tasks as specified in the Technology Standards for School Administrators. Had the researcher used the concepts involving certain competencies and technology integration e.g. technology-based management systems for student records, availability and accessibility of technology, as concepts under the standards theme rather than the competencies and integration theme, the association between the TSSA Standards and the actions of the principals would be greater. With the wide range of skills, competencies, and technology integration techniques displayed by the principals, and the extent to which the principals relate to the technology standards, suggests that the Technology Standards for School Administrators might be too broad to address the technology specific role of the elementary principal.

The significance of technology skills and competencies of the elementary principal is underscored by the potential that the technologically skilled principal brings to fundamental aspects of technology integration. In particular, the technologically competent principal has the ability to provide on-site and curriculum specific professional

development. The development of collegial working conditions, in particular when the principal works with the teachers to develop technology skills and develop technology integrated lesson plans, the observation/evaluation cycle, as it relates to technology, is more closely associated with clinical supervision. Technologically skilled principals, especially those who have the ability to repair hardware and solve software problems are able to maintain the technology program in adverse technological and adversarial human conditions. In addition to directly assisting staff with technology, the technologically competent principal may utilize technological expertise to develop productive relationships with key technology personnel.

Whether or not the principal is technologically competent doesn't diminish the necessity for building a strong relationship with the technology coordinator. In many instances technology coordinators and technicians are not educators, however they have critical roles in the delivery of instruction. The principal is ultimately responsible for the development and cultivation of the relationship with the technology coordinator to insure the maintenance of all aspects of educational technology delivery systems.

Principals who possess the technological ability and have access to technology-based student record keeping and statistical software e.g. SASI and InteGrade Pro, can access all academic and discipline statistics with stark immediacy, and hence, make better informed decisions based on statistical information.

Most principals indicate that they are integrating technology into all curricular areas, however principals with technological competencies are better able to train staff in the use of technologies that will more effectively integrate technology, curriculum and instruction. Faculty and staff with unlimited access to computers, in particular those with

issuance of their own laptops, report significant pedagogical changes including the amount of inquiry-oriented instruction, project-based activities, increased collaboration with teachers, and more communications with students (Apple K-12 Effectiveness Reports, 2002).

Principals who use electronic communication with teachers and parents maintain a constant flow of information. Information is essential to the principal in order to gain a sense of the climate in both the school and the community.

High-Technology schools are viewed by the community and business as successful and tend to gain more support and reap the benefits of business cooperation and contribution.

Conclusions

The administrative technology standards, technology usage of the administrator, and technology integration are relatively new fields of research and exploration. The first completed draft of the Technology Standards for School Administrators was just completed in October of 2001. It was the intent of the researcher organize the interview in such a manner as to allow information to come forward that had previously not been incorporated into the literature. The following are the conclusions of this research:

1. Principals relate to administrative technology standards to a considerable extent.
2. The use of technology by the principal caused no apparent change to the "extent" to which the administrative technology standards corresponded to principal activities and behaviors.
3. The inter-personal relationship that the principal develops with the technology coordinator or technician can alter the technology program.

4. Principals typically use technologies to effect efficient office management.
5. Principals with greater technological proficiencies, tend to use technologies that impact the entire school community.
6. Principals who have advanced technology skills have an advantage in furthering the technological professional development of staff.
7. Working personally with, and training staff in technology, may decrease the principal's need for formal classroom technology observations.
8. Technology is integrated through curricular integration and through the dissolution of separate curricula.
9. Principals who demonstrate technological proficiencies integrate technology with greater technological specificity.

Recommendations for Further Study

There are numerous links between the principal, technology, and student achievement yet to be uncovered. The following are several recommendations for future research questions:

1. Is there a relationship between the age of the principal and technology use?
2. How does District Factor Grouping effect implementation and integration?
3. How does the principal evaluate the effectiveness of technology?
4. Does administrative technology professional development increase the effectiveness of technology integration?
5. Replicate the study using middle school and secondary school principals.

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APPENDIX

Interview Questions

1. How do you foster a shared technology vision?
2. What do you do to advocate "best practices" in technology?
3. What do you do to promote technology integration in curricular design and instruction?
4. Describe the degree of assistance that you provide for teachers to utilize technology to access, analyze, and interpret student data.
5. How often do you provide, design, or support technology-based professional development opportunities for your staff?
6. What type of technology-based student record keeping system do you and/or teachers use?
7. What type of technology do you use to communicate with peers, experts, and educational stakeholders?
8. How often do you provide opportunities for staff to share technological innovations with one another as staff development?
9. In what ways do you model the use of technology to identify, analyze, and interpret school data to improve student learning and productivity?
10. Are the staff's technological proficiencies, as measured against current technology standards, important to the assessment of instructional staff?
11. What type of word processing do you use? How do you use it?
12. What type of database applications do you use? How do you use it?

13. What type of spreadsheet applications do you use? How do you use it?
14. What type of E-mail do you use? How do you use it?
15. What type of presentation applications do you use? How do you use it?
16. What type of desktop publishing do you use? How do you use it?
17. What type of world wide web navigation and search engines do you use? How do you use it?
18. What type of statistical applications do you use? How do you use it?
19. What type of class scheduling applications do you use?
20. How many students are using technology for basic skills acquisition?
21. How many students are using technology to achieve higher-order thinking skills?
22. How many teachers design and implement technology-based learning experiences that promote higher level learning, and authentic assessment? How is this done?
23. What technology resources are available that supports specific topics or lessons? How many teachers utilize these resources?
24. What is the availability and accessibility of technology that supports varieties of teacher and student experiences?
25. How are technology resources being allocated, e.g. staff development?
26. What building level organizational structure exists that supports all aspects of technology?
27. What is the extent of community involvement regarding technology in your school?
28. How is technology used to align standards, curriculum, and assessment?
29. What percent of students have continuous access to technology in school?